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Automobile
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AUTOMOBILE JOURNAL

10 cents the copy

PAWTUCKET, R. I.

\$1.50 the year

VOL. LXIII.

FEBRUARY 10, 1917

NO

775738

Vol 4:
Feb - 8
1917

THE BOSTON SHOW

ADVANCE NUMBER OF THE

Automobile Journal

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The world faces a leather famine.

Tremendous war demand, diminished imports and decreasing supply of cattle have combined to make leather of all grades scarce and precious.

Shoe manufacturers predict that without quick relief, 1917 leather shoes of good grade will retail at \$15.00 to \$20.00 a pair; already prices are up 50% to 100%. Sole leather has already sold for more than one dollar a pound.

The Government is supplying our Navy with shoes having soles made of a leather substitute, and is experimenting with the tanning of sharks' hides to help relieve the leather situation.

How Motorists Can Help a Lot

The largest leather consuming industry is the shoe business. The second largest is the automobile business. The leather required to upholster the average touring car is enough to make the uppers of three dozen pairs of shoes. The grain leather used on expensive cars makes the best shoe leather. Its increasing scarcity has necessitated large use of split leather in shoe making. The latter is the grade used most in the automobile industry.

The motor-car buyers of America must decide which they will do without—**leather in shoes or leather in automobiles.**

Du Pont Fabrikoid, Motor Quality offers the best solution of the problem.

This remarkably successful substitute for leather is already used for automobile upholstery more than all other materials combined. While not yet equal to grain leather, it surpasses split leather for upholstery purposes.

Those automobile makers still using split leather admit, to us, that it is inferior to Motor Quality Fabrikoid, but hesitate to adopt it for fear some buyers will still think split leather (commonly advertised "genuine leather") is better. They will gladly adopt Motor Quality Fabrikoid, and thereby greatly conserve the dwindling supply of shoe leather, if you will help.

When buying an automobile tell the dealer you prefer Du Pont Fabrikoid, Motor Quality upholstery. Many dealers in popular makes can and will tell you their cars are so upholstered. Dealers in other cars can get Fabrikoid upholstery if buyers ask for it.

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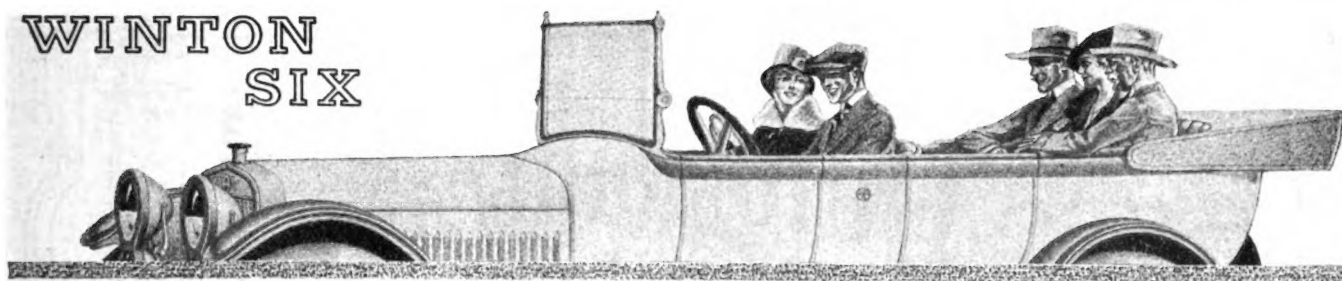
For making and lining suit-cases, satchels, handbags, etc.

For glove gauntlets, sanitary hat sweats, boxes, toys and novelties.

For sock linings, facings and
tongues of shoes.

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If your friends all looked a'like, dressed alike, acted a'like, and talked alike, they would become intolerable. Monotony is the death of friendship and of interest in life.

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Happy is the owner of a splendid motor car designed expressly to his personal taste, a car that distinctly *belongs* to him. To create for you precisely that most desirable car, is the Winton Company's purpose. Our artists and artisans are at your service, prepared to supply body style, color harmony and appointments just as you would have them. It is our happiness to make your wishes come true. Simply telephone or drop us a card.

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AUTOMOBILE JOURNAL

Remittances:

Should be made by Check, Draft, Postoffice or Express Money Order, or Registered Letter. Money enclosures must be at sender's risk.

Entered as second class matter, April 15, 1906, at the Postoffice at Pawtucket, R. I., under act of Congress of March 3, 1879.

Ten Cents
a Copy

VOL. XLIII. FEBRUARY 10, 1917. NO. 1.

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Treasurer . . WILLIAM H. BLACK

Secretary D. O. BLACK, JR.

Published the 10th and 25th of each month by the

AUTOMOBILE JOURNAL PUB. CO.

Times Building, Pawtucket, R. I.

THE Annual Crop of motor car bills is now before the legislatures of the various states for enactment. The crop is much larger than in any previous year at this season and, therefore, of proportionate interest to everyone who owns or drives a vehicle propelled by an engine. Some of these bills are "plain foolish;" some are plainly vicious, while a large number are worthy of the support of motorists and of enactment. No responsible member of motordom will protest the passage of the last named class of bills, but he ought and will exert every effort to defeat any proposal that encroaches upon his acknowledged rights as a citizen of the United States.

FIGHTING Vicious legislation single handed is comparable to the romantic battle waged by Don Quixote against the windmill—and about as satisfactory. An individual may start a fight, but to carry it through triumphantly he needs the support, either active or moral, of every person effected by the bill being assailed. In other words, motor car owners should band together in the largest possible organization to combat every influence that may adversely effect the pleasure, profit and continuance of motor vehicle operation.

SUCH Co-Operation between individuals can be best brought about by the motorists enlisting with the city, state, sectional and national organizations that are established to protect and further the interests of motordom in general. The more members these organizations can claim the greater will be their influence. They can be made so powerful and their influence made so far reaching that no legislator would be so foolhardy as to propose obviously vicious bills simply for the sake of gaining notoriety in the public prints.

NEW ENGLAND Motorists will be interested in the resume and comment made by the General Counsel of the National Automobile Association on the bills now before the legislatures of the New England states, which article begins on page 23 of this issue. These bills are not only of vital concern to residents of the various states mentioned, but also to motorists in other sections, because they represent a tendency that should be studied and directed in other parts of the country. The Legal Department of the N. A. A. is watching this year's bills very closely, to protect its members.

THE Chicago Show having passed into automobile history as the greatest ever staged in the Middle West, motordom has turned its attention to Boston, where the last great exhibition of motor cars of the year is to be held the first week in March. Though Chicago reported sales approximating \$3,500,000 this year, the Boston Automobile Dealers' Association, under whose auspices the Boston show is held, is confident that their exhibition will far exceed both Chicago and New York in point of actual retail sales made. They base their belief on past performances, on the wealth of the huge territory drawn from and upon the fact that it is one of the most representative shows of the year.

THE Annual before the Boston Show Number of AUTOMOBILE JOURNAL will consist of several special feature articles that will help to substantiate the Boston dealers' claims, as well as a prophecy of what motorists find at the exhibition, which is to be held in Mechanics building, Horticultural hall and the ball room of the Copley Plaza hotel. This number will be a complete guide to the show and will be worth far more than the price of a year's subscription.

Looking from the Inside—Out

There is no growth or advancement possible without an ideal or an aim, whether it be men or motor cars you are considering.

The men and the motor car are intimately related.

Thus, the Grant Six reflects the ideals of the group of men who first conceived and brought into being the six cylinder car priced at less than a thousand dollars.

Three years ago the Grant Six was an unknown quantity—a daring idea—a SIX CYLINDER car at a price lower than many fours.

That the idea was sound, and that it was possible to build a SIX and a good SIX for a low price is attested by the success of the Grant Six and the quality of the Grant Six.

It is an interesting fact that the success of the Grant Six is founded on the determination of the group of experienced automobile men composing the Grant organization, to build success solely on the basis of giving EXTRA VALUE—as much automobile value as it was possible to give and still make a fair profit on the investment.

This ideal has continued to govern—and the same group of men are directing Grant Six manufacture and sales; thus, it is logical that the Grant Six of today is a much more beautiful car, more handsomely finished, with marked improvements in the nature of refinements at every point.

It sets the mark for automobile value below a thousand dollars.

The new Grant factory at Cleveland, rated a model of efficiency, with an annual capacity of 35,000 cars, makes possible a value without precedent in the automobile business.

The cars Grant dealers are now showing will please you by their size, power, economy, strength and ability. At every point we have reason to be proud of our product.

And this is the reason why Grant Six sales for 1917 exceed those of any previous year.

Grant success is drawing dealers like a magnet. It is helping Grant dealers everywhere—for there is no sounder foundation for a good motor car business than the principle of giving EXTRA VALUE in the car.

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Cleveland, Ohio

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UNIVERSAL TRUCK ACCOUNTING SYSTEM

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(When Writing to Advertisers, Please Mention the Automobile Journal.)

The Automobile Journal

VOL. XLIII.

FEBRUARY 10, 1917.

NO. 1.



CALIFORNIAN HIGHWAYS.

Motor Touring in California is a Revelation to Many Easterners, Because of the Wonderful Net Work of State and County Highways Existing, Three Views of Which Are Shown. Over \$75,000,000 Has Been Spent on Highways Since 1911, Part of Which Went Into Construction of Such Viaducts as Illustrated at Left.

CALIFORNIAN MISSIONS.

One of the Chief Points of Interest to a Tourist in California is the Scores of Ancient Missions Still Standing in All Parts of the State. The Two Edifices Shown Above Are the Mission Dolores (Left) in the Heart of San Francisco, One of the Best in the State, and the Santa Clara de Assis, in Santa Clara.

Seeing Central California From A Motor Car

Little Motor Journeys Through the Heart of California, Passing from the Balmy Clime of the Pacific Coast Through Thousand-Acre Orchards of Blossoming Flowers and Trees to the Snow Clad Tops of Lofty Mountain Peaks

"Out where the sun's a little brighter,
Where the snow that falls is a trifle whiter,
Where the bonds of home are a wee bit tighter—
That's where the West begins.

"Out where the skies are a trifle bluer,
Out where friendship's a trifle truer,
Out where everything is newer—
That's where the West begins."

THESE lines culled from a recent poem by a western poet are truly descriptive of the great western section of our country and particularly of where the West ends, in a land of enchantment along the Pacific Coast. And

of all the Pacific's shores, California, with its fertile valleys amid lofty mountain ranges, is entitled more than any other section to the appellation, "America's Paradise."

What Constitutes Central California.

In this vast state there is one section which stands out prominently in the estimation of travelers and tourists. This is known as Central California, and embodies the central coast counties laying between the Pacific Ocean and the Sacramento and San Joaquin valleys, and including the latter. On the south the section is bounded by San Luis Obispo county and on the north by the counties of Mendocino, Lake, Colusa and Yolo.

Concentrated in area section are found all the scenery, topographical conditions, fauna and vegetable life that make it a veritable wonderland.

Hundreds of rivers rise in the mountain range to the east of the valleys and flow westward to join the big rivers that drain into Suisan Bay, which leads out to San Pablo and San Francisco Bays to the Golden Gate. This great natural irrigation system has made these valleys the richest and most productive agricultural and horticultural sections of our country and has made possible the creation of more wealth than all of California's great mineral resources.

In most of this territory the climate is like that of a Mediterranean summer



A Glimpse of Monterey's Scenic Coast Line on Seventeen-Mile Drive, Near Del Monte. These Cypress Trees Are Found Only on Monterey Peninsula and in Palestine.

throughout the year, and as a result it has become the mecca for tourists from all over the world. Thousands of other people have established their homes there, being attracted by ideal living conditions, beautiful scenery and foliage.

It is not natural that in such a glorious environment would be found a people who are alive and alert to their fortunes and surroundings. The residents are not only proud of but loyal to their bountiful habitations and have made improvements and established enterprises that are in keeping with the country and which have made accessible the many scenic spots and wonders that abound throughout the territory. A vast net work of wonderful roads has been built up in the state, which has earned it the title of "the motorists' paradise," a fact which is demonstrated in the registration of over a quarter of a million of automobiles in the state, which has a population of about two million and a half people.

Huge Expenditures for Roads.

More than \$75,000,000 has been spent upon this system in the past five years, of which amount \$25,000,000 went into the construction of new highways and the remainder to defray the expense of rebuilding and maintaining the old roads. In addition to this the counties have made large expenditures, enabling the motorist to travel continuously for months through virgin territory, seldom being obliged to traverse a route twice, although many of the highways could be traveled continuously without the monotony of repetition that usually arises from repeated tours in most sections.

With full appreciation of his gifts from bounteous nature and the enhancement of their value by his works, the Californian has not rested idly under his laurels, but has heralded to the world at every opportunity the virtues of his country and climate. Those in Central California organized a Tourist Associa-

tion with the view of not only enlightening American motor tourists to the wonderland in California, but to encourage him to visit the state by removing many of the obstacles that might discourage him in making such a trip.

Headquarters of the association were established in New York City and it was announced that a special train was being organized to leave New York City on Feb. 24 on which automobiles of owners desiring to tour in California would be shipped under the care of the organization to San Francisco. When he arrives in San Fran-

cisco, the motor tourist will find his car ready for the enchanting tours that have been mapped out with itineraries, hotel rates and other detail by the association.

His only difficulty now presents itself in the confusion resulting from an attempt to choose his route, which is something akin to that experienced by the spectator at a three-ring circus—there is so much to see! There are beautiful bays, inlets, massive coast formations, rivers, mountain scenery, vast valleys, where millions of fruit trees in blossom, mammoth redwood trees, which are the oldest living things in creation, ancient missions that have stood for centuries, magnificent estates, where the art of landscape gardening is worked out in its ultimate state of perfection, aided by the almost perpetual sunshine.

Over 20 different tours have been mapped out through Central California, all of which crowd into a day's ride a multitude of interesting and beautiful sights. If San Francisco is to be made the starting point the first glimpse into California's wonder-

land is gained on the "Half Moon Bay—La Honda Canyon Tour," which follows the shores of San Francisco Bay and the Pacific Ocean with cross country cuts through the La Honda valley.

On the trip out through the Golden Gate Park the route passes along the shores of San Francisco Bay through Burlingame, a fashionable suburb, where the highway is lined on both sides with tall poplar and eucalyptus trees, into San Mateo. From the latter place a cut is made toward the ocean shores of the peninsula through the Causeway that separates the Crystal Springs Lakes and over the ridge of the Sierra Morena range of mountains, to Half Moon Bay.

Up the Sierra Morena Mountains.

Eighteen miles south of this town is Pescadero, where the route turns eastward again into the Pescadero and La Honda canyons. Through this stretch there are dense growths of ferns, brakes and berry bushes in the creek bottoms, while oaks, madronas, redwood, sycamores, laurel, eucalyptus and pine flourish on the hillsides. There is a nine-mile climb up the summit of the eastern slope of the Sierra Morena mountains and on the descent of the western slope into Portola Valley there are many beautiful vistas to the north and south.

Before striking out into the distant valleys and mountains there are a number of pleasant tours that can be covered in a day and permit the tourist to return at night to San Francisco. One of these is the "Foothill and Canyon Tour," which leads out of Oakland over the Lincoln



Through the La Honda Redwoods in San Mateo County. This Charming Drive Through Almost Primeval Redwoods Is but a Few Miles from San Francisco Bay.

Highway, through San Leandro, by Lake Chabot to Dublin. At Dublin the tourist leaves the Lincoln Highway, turning southward through Hearst to Sunol, where the route turns westward in Niles Canyon to Niles and Alvarado. From this point the route is north to the starting point. Between Dublin and Sunol, in Livermore Valley, is a hacienda surrounded by a beautiful grove of trees and broad gardens, while just beyond Sunol is the famous Sunol Water Temple.

The "Wishbone Tour" is another of these short, but interesting routes which follows the shores of San Francisco Bay from San Francisco around to Oakland via San Jose, where is located a long chain of missions established by the Spanish padres. This route, which is a level boulevard throughout its entire length, passes through Palo Alto, where the Leland Stanford Jr. University is located.

The "Tomaes-Inverness-Bolinas" tour is routed through a section known as the "Playground of Central California," lying on the peninsula to the north of San Francisco and bounded on the west by the Pacific Ocean and on the east by San Francisco Bay. This route lies in the southwestern section of Marni county, which is renowned for its scenic drives, mountains and forests of redwood, pines, spruce and its level beaches and rugged coast line.

These tours form the net work of highways that lead from and along the shores of the ocean and bay to all sections of Central California. To the southward a beautiful highway runs along the foot-



Mission San Carlos de Borromeo, Near Carmel-by-the-Sea, Frequently Called Mission Carmel, Founded in 1770, and Restored in 1868. Services Are Still Held Here, Once a Month.

hills overlooking the ocean through San Mateo, Santa Cruz and Monterey counties. Much of the section is densely wooded and the coast line is wild and rugged.

At Monterey is the old custom house over which the American flag was first raised on the Pacific Coast. The Mission San Carlos and the Spanish quarter with many historic buildings also form interesting sights worthy of inspection. Two miles further along on the shores of Monterey Peninsula is the town of Pacific Grove, where the famous 40-mile drive starts. This drive is reputed to be one of the most perfect and beautiful in the world, skirting the rugged coast line within view of the Pacific Ocean for a distance of 40 miles to Carmel-by-the-Sea.

Near this latter town, where there is a colony of well known authors and artists, is the buff-colored Mission of Carmel, which is considered one of the best and purest types of old Spanish architecture to be found in this country. It was at this mission, which is one of the best preserved of all those on the coast, that Father Junipero Serra, the great Franciscan pioneer and founder of California's missions, made his home and is buried.

Turning to the northward again and crossing the Golden Gate to Sausalito, a beautiful highway leads to Santa Rosa, the home of Luther Burbank, the famous plant wizard, and the Petrified Forest, where the ground lies thickly strewn with trunks of trees turned to stone by the elements. Some of these are seven feet in thickness. Further on the road leads into Calistoga and southward through the famous Napa Valley, which is noted for its excellent highways, bridges, vineyards and scenery. It has also been called the "Valley of the Vine," because of the well kept vineyards and old stone wineries, and was at one time the home of Robert Louis Stephenson. Between these two routes is Sonoma Valley, given world wide publicity as the "Valley of the Moon," by the late Jack London, who maintained a beautiful ranch there.

To the eastward there is a route forming the "Horticultural-Agricultural Tour," which runs through Solano county to Davis, where the State Agricultural Experimental Farm is located. Throughout this territory there is intensified cul-



The Boulevard Highway Winding up to the Crest of Mt. Diablo, Whose 4000 Foot Summit Affords a Panorama of Twelve California Counties—San Francisco Is but 30 Miles Away.



The "Road of Enchantment" in San Mateo County, Otherwise Known as the La Honda Road.

tivation of deciduous fruits, citrus fruits, grain and alfalfa. It is also a great dairying country.

California Redwood Park, in San Mateo county, amidst the Santa Cruz mountains, is one of the wonder spots of the state. It forms a gigantic bowl, the bottom covered with grass and wild flowers and the sides dotted with redwoods, many of which are from 350 feet in height and 50 to 60 feet in circumference. Its form has given it the name of "Big Basin." This preserve covers 3800 acres and belongs to the State of California. These are not the largest trees in California, those at General Grant National Park and the Giant Forest Groves containing the largest individual specimens. There is one in Mariposa Grove, Yosemite National Park, through which the highway passes and a motor car with its top up can pass through the great hole that has been cut in the butt to allow of passage.

Mt. Diablo, 3849 feet above the sea level, is reached by good highways, which lead out of Berkeley by the tunnel road piercing the Berkeley Hills and emerging in Contra Costa county. The highway leads to the foot of the mountain and a fine new boulevard winds up its canyons to the summit, affording beautiful panoramas of the valleys and mountain peaks.

Another mountain peak, famous with tourists the world over, is Mount Hamilton, 4209 feet above sea level, where the Lick Observatory is located. This peak is in Santa Clara county and is reached by a perfect highway running from San

Jose. The trip to the observatory if taken on a clear day is one of the most beautiful imaginable. In the last seven miles there are 62 curves. From the summit and on many stretches on the way up, the valley is viewed for miles and one can look over San Francisco Bay. Tourists are invited to inspect the observatory and are permitted to look through the telescope on Saturday nights.

California is best known the world over for its outdoor life the year 'round, particularly for its sports and its open air theatres. In no

malpais, Marin county, is another natural theatre, where a mountain play is given annually before a great throng. At Santa Cruz a summer programme and pageant is given at River Theatre, beneath the beautiful trees, while on the grounds of Del Monte there are dramatic presentations in most picturesque of surroundings. The Forest Theatre at Carmel, Monterey county, where a large colony of artists and writers make their homes, is, next to the Greek Theatre, the scene of the greatest number of plays.

As for outdoor all-year sports California is supreme. Polo, golf, tennis, yachting, motoring, fishing, boating and bathing are indulged every month of the year. For winter sports the Yosemite Park and Huntington Lodge in the Sierras, in Fresno county, are widely known.

Tours into the Yosemite Valley and to many other points can be made over excellent highways, which will repay with entertainment and instruction any loss of time and money as the wonders unfolded are to be seen only in California and no where else in the world.



Cathedral Spires, a Natural Wonder in California.

Chicago Attendance 15 Per Cent. More Than 1916

Seventh Annual Exhibition Is Accounted the Greatest Ever Held in the Middle West and Is Considered to Have Been On a Par with the Show Held This Year at New York—Six New Cars Shown the Public for the First Time

THE seventh annual automobile show held at the Coliseum and the Armory in Chicago was a grand exemplification of the magnitude of the great motor car industry, which in the past year was developed into billion dollar proportions and crept into first rank among mechanical industries of the country. It also foreshadowed an outlook in the trade which promises to eclipse even the enormous activity that placed 1916 in the banner position in the history of the automobile.

Compared with New York.

The size and nature of the exhibition at Chicago in its relation to the New York show and last year's shows is shown in the following table:

	Chicago		New York	
	1917	1916	1917	1916
Car exhibitors...	92	80	95	84
Cars and chassis	324	294	340	322
Four-cylinder...	101	106	120	116
Six-cylinder...	164	135	143	135
Eight-cylinder...	41	42	47	41
Twelve-cylinder...	18	11	15	13

As will be seen by these figures, the Chicago show, numerically considered, is practically on a par with the New York show of this year. In point of importance in the industry, however, the Chicago exhibition is looked upon as one of the big events of the year, as it has developed into a great business convention for dealers and manufacturers. This phase of activities was more pronounced this year than ever before, a fact which augurs of a continued period of unprecedented prosperity in the automobile trade during the current year.

38,000 Invitations to Dealers.

Owing to the fact that this year deal-

TRAMPS AND AUTOS.

The consignee of a car load of automobiles from Detroit upon examining his consignment found that some tramps had broken into the freight cars and finding that occupying the sumptuously upholstered seats in the machines was better than riding the brake beams, had disported themselves in luxury on their trip East. They were not satisfied, however, with their Pullman-like seating arrangements, but departed with the tool kits from the various machines.



ers who attended were not required to register upon entering the show, it was impossible to check up accurately the number that did attend. Invitations were sent out to 38,000 distributors and dealers throughout the country and as the total attendance was over 15 per cent. greater than at last year's show, it is assumed that the number of dealers present was the largest on record. This assumption is also borne out by the fact that the actual bona fide business accomplished was so great that it had the effect of encouraging manufacturers to place their prices on a basis where their profit is nearer the percentage of manufacturing cost than it has been since the war started and brought about enormous increases in material costs.

Many cars were purchased direct from the floor, including some of the highest priced exhibits, while dealers generally contracted for allotments for the year which were from 25 to 50 per cent. greater than they handled last year and in some instances the orders were increased over 100 per cent.

Not So Many Accessories.

It is needless to state that with this boom condition current in the car market the accessory exhibitors enjoyed a proportionate share of orders, although the accessory exhibit as a whole was somewhat restricted owing to the lack of available space. However, every car that is sold makes a sure prospect for dozens of articles of equipment and this fact is supported in the figures showing the growth of the accessory industry during the year just closed.

Although to some extent of secondary importance, a striking feature of the Chicago show was the magnificent decorations, which were carried out on a scale not heretofore attempted. The general color effect was much darker than predominated at the New York show and many visitors expressed the opinion that it made a far more appropriate background for the rich and deep finishes on most of the exhibits.

For the past year workmen had been busy preparing the decorations, which represented an outlay of nearly \$50,000. The decorative scheme was that of mediaeval architecture as found in an ancient English castle, having for its rep- lical suggestion huge pillars, illuminating effects through imitation leaded glass and historical and allegorical panels along the ceiling. A similar effect was also carried out in the Armory.

The exhibits included four new cars that were not shown in New York, the Stephens, manufactured by the Stephens Motor Branch of the Moline Plow Co.,

Moline, Ill.; the Chicago Six, made by the Pan-American Motors Corp., Chicago; the Classic, made by the Classic Motor Car Corp., Chicago, and the Hassler, made by the Hassler Motor Co., of Indianapolis, Ind.

In the second annual Chicago Salon, which was held in the Elisabethan room of the Congress Hotel, two other new cars were introduced to the public, the Fageol and Disbrow.

Just which one of these six new makes attracted the most attention it would be difficult to say, but through virtue of its novel power plant, luxurious body and many novel features, the Fageol was the subject of much discussion. It is a product of the Fageol Motors Co., Oakland, Cal., and with the custom body by Kimball, finished in gray green and equipped with a victoria top, with silk plush lining, silk plush floor coverings, elder down cushions and ivory set door handles, was priced at \$12,000, which is the highest figure set on any car on exhibition.

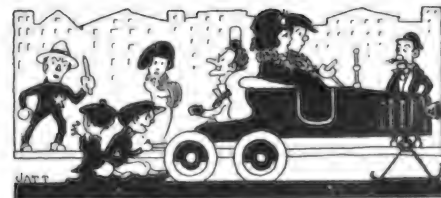
Details of the New Fageol Chassis

The principal feature of the Fageol, however, is the power plant, which consists of a Hall-Scott six-cylinder engine, which weighs 560 pounds and is guaranteed to develop 125 horsepower at 1300 revolutions. It is of vertical type with the cylinders cast singly and an overhead camshaft. The bore is five inches and stroke seven inches, giving a total piston displacement of 824.67 cubic inches.

The rear end of the power plant and the gear box are mounted on a sub-

RUNNERS ON A FORD.

Leon C. Roberts of Readfield, Me., finding that his Ford was not properly designed to buck the big snow drifts on the country highways, removed the front tires and substituted runners with practical results. He claims that he can make better speed with the runners and can also negotiate drifts that would be almost impossible with wheels. The idea seemed so practical that many Ford owners in Maine have emulated Mr. Roberts in converting their machines into snowmobiles.



frame, which branches off from the main frame behind the radiator and extends back, following the contour of the engine as far as the clutch, where the sub side members run parallel with the main side members back to a cross member. The engine and transmission units extend back over three-quarters of the length of the chassis, an extremely short propeller shaft being used with universal couplings at both ends. The rear axle is of the semi-floating type with single brake drums.

A very distinctive appearance is given the car by the radiator, which has a sloping front set at an angle of 15 degrees. The company makes only the chassis, in either 135 or 145-inch wheelbase, and the price without body is \$9500.

The New Four-Cylinder Hassler

Interest in the Hassler car was largely centred in the mechanical features of the chassis. Charles Merz, the speedway driver, developed most of the mechanical details and the company consists of interests identified with the manufacture of Hassler shock absorbers.

The engine is a Buda four-cylinder, L head standard block type, with a bore of $3\frac{1}{4}$ and stroke of $5\frac{1}{2}$ inches, with a power output of 40 horsepower at 1950 revolutions per minute. It is equipped with a Rayfield carburetor, Connecticut ignition system and Auto-Lite starting and lighting system with a Willard six-volt 100 ampere-hour battery. Transmission is through a Borg & Beck dry plate clutch and a Grant-Lees gear box. The drive is through a propeller shaft fitted at both ends with Thermoid-Hardy flexible disc couplings. The torque is taken through two radius rods, which are fixed at the extremities of the rear axle housing and extend to the under side of the gear box, where they are bolted against heavy volute springs that are housed in a special case to take the horizontal road shocks.

An unusual feature is found in the spring suspension, transverse X type being used on the rear with the upper member hung on a fixed bolt at one end and shackled at the other. The upper member instead of being superimposed upon the seat of the lower member is set in back and flush to gain a low centre of gravity.

The car is equipped with a Stewart-Warner gasoline feed system, Boyce moto meter, five wire wheels with Silvertown cord 33x4 inch tires, front and rear bumpers, all of which is included in the purchase price of \$1650. A roadster body only is being fitted to the chassis at present, with seating accommodations for two. The seating compartment is very roomy, however, measuring 66 inches in length, with a seat width of 45 inches.

Two Models of Stephens Six Cars

The Stephens Six, which sells for \$1150, is largely an assembled product and is made with a touring body and

roadster, known as models 65 and 50 respectively.

The engine is a Continental light six, $3\frac{1}{4} \times 4\frac{1}{2}$, cast en bloc and the clutch and gearset are mounted in the standard bell housing, the whole forming a unit power plant. The clutch is of the multiple disc type and the transmission is through a three-speed gear box and propeller shaft with double universals. The rear axle is of the floating type and the drive is by the Hotchkiss method, through the springs. The engine equipment includes a Zenith carburetor, Stewart vacuum gasoline feed system, Auto-Lite starting and lighting system, Connecticut ignition with Willard storage battery.

The car equipment included in the price consists of a Stewart-Warner speedometer, Stewart engine driven tire pump, extra demountable rim, trouble lamp, jack, tools and repair kit. The wheelbase is 115 inches and the wheels are fitted with 32x4 quick detachable plain tread tires in front and non skids on the rear.

In the Chicago Light Six the principal feature is the frame design. At the rear, where the frame is full width, it curves upward, forming an arch over the rear axle and gives the car a low centre of gravity. The frame members are parallel from the rear ends to where the front hangers of the rear springs are attached. From this point the frame tapers in sharply to the rear of the power plant, making it possible to hang the latter directly to the main side members, which from this point continue out to the ends in parallel lines.

Chassis of the Chicago Light Six

The power plant in the Chicago consists of a unit formed of a Rutenber 40 horsepower six-cylinder engine, $3\frac{1}{4} \times 5$, a multiple disc dry plate clutch and a Warner selective three-speed gearset. The engine is fitted with a Rayfield carburetor. The Gray & Davis system of starting, lighting and ignition is used with a Willard storage battery.

The drive is through the rear springs, which are semi-elliptic, two inches in width and 57 inches long, underslung under the main frame members to prevent weaving strains. Timken rear axles, with 12-inch brake drums and Timken roller bearings are used. The wheelbase is 120 inches and the wheels are fitted with 32x4 tires. Wooden artillery wheels are standard. Houk wire wheels are supplied for \$75 extra. The price is \$1250. The standard color finish is lake blue on the body, with white enamel on the running gear and windshield frame.

The Classic is a New Low Priced Car

The Classic, the only new car shown in the low priced class, is an assembled product. The chassis, which has a wheelbase of 114 inches, is equipped with a Lycoming four-cylinder engine, $3\frac{1}{2} \times 5$. The drive is through a Borg & Beck clutch, Mechanic's Machine gearset and

Gemco floating axle. Gemco steering equipment is used and a Youngstown radiator. It is completely equipped, including spotlight and bumper, and sells for \$885.

The New Disbrow Car Has Speed

Louis Disbrow's new creation, which bears his name, and which is designed on speed lines, stood out prominently as a feature of the Salon exhibition. The car shown had a special aluminum body built by Disbrow, consisting of the engine hood and skeleton seats. The car presents an unusual appearance, as the old individual type of mudguard on each wheel is used. These guards turn with the front wheels and give the occupants protection against the flying spray and mud that is usually thrown up when turning corners at high speeds. There is no standard body size, the seats being built to seat the individual purchasers.

The main feature of the Disbrow car is its speed. There are two models, one guaranteed to make 80 miles an hour and another guaranteed to do 90 miles. The only difference in these models is in the sizes of the Wisconsin engines used, all the other mechanical equipment being identical. The engines are of the T head type with cylinders cast en bloc, designed according to specifications furnished by Disbrow, with steel pistons and light connecting rods.

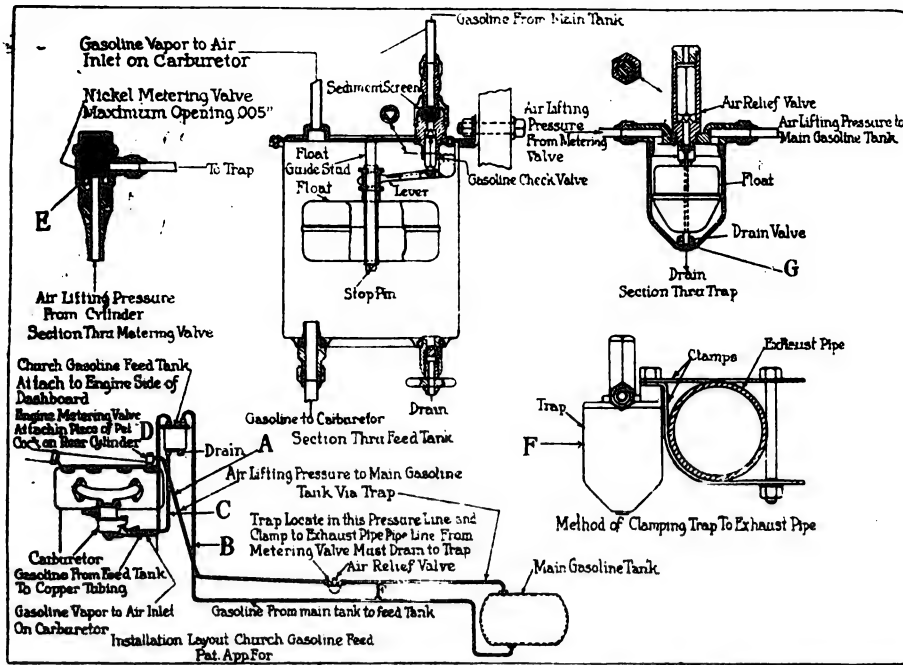
The crankshaft is carried on three large bearings and is lubricated by pressure feed. The small size engine is 5.1x 5.5, but has the same size valves as the larger one, which is $5\frac{1}{4} \times 7$. The valves, which are of tungsten steel, are actuated by helical gears from a camshaft similar in design to those used on many types of racing cars. The transmission of power is by a Borg & Beck clutch. Warner three-speed gearset and floating American ball bearing rear axle.

The wheelbase on both models is 114 inches and the wheels are fitted with 33x4½ tires. Bosch electrical equipment is used for starting, lighting and ignition. The ignition system has double-plugs, being mounted on both sides of the T head of each cylinder. The new racing type of Miller carburetor is used.

The model with the smaller engine sells for \$2650 and the higher powered model for \$3500.

GREAT HIGHWAY FOR EASTERN VENEZUELA.

The Venezuelan government is planning another great highway to connect its principal cities on the eastern side of the country. One has already been projected, known as the "Great Western Highway of Venezuela," which will connect Caracas with the western border state of Tachira. The eastern highway will start from Caracas and terminate in the interior of La Guayana, running through the states of Miranda, Anzoategui and Bolivar. The minister of public works will be in charge of the construction of the new highway.



Components and Installation Layout of the Church Gasoline Feed System, Which Is Operated from the Engine.

The Church Fuel Feed System

This Equipment Is Designed to Force Fuel From Main Tank By Utilizing Compression in Engine

THE Church fuel feed system in its latest development is designed to transmit a portion of the gas under pressure from one cylinder of the engine, purify it, and utilize the pressure for forcing gasoline from the main tank, which may be placed below the carburetor level to a smaller gravity tank placed on the dash from whence the fuel may fall to the carburetor.

The system consists of three units, in addition to the necessary tubing. The units are the metering valve, the air relief valve and trap and the auxiliary tank.

The metering valve consists of a small nickel-steel disc 1/32 inch thick, which moves .003 of an inch on each compression and explosion stroke of the cylinder. This valve allows .005 of the cylinder volume to pass through it to the trap and can build up a considerable pressure in the rear tank.

The air relief valve and trap receives the gas under pressure from the metering valve. This unit is mounted on the exhaust pipe and contains a small amount of water in the chamber, through which the gas from the metering valve must pass. All moisture and particles of carbon are caught in this trap and as the level in this chamber rises, due to the collection of such particles of carbon, the float rises and automatically the collected matter is expelled through the valve "G," thereby bringing the level back to normal. The air relief valve in the top of the trap is normally set at 1.5

pounds and will not permit the pressure in the tank to exceed this amount.

The auxiliary tank receives the gasoline from the main tank through a sediment screen, which removes all small particles of foreign matter. The level of the gasoline in this tank is controlled by a float and linkage to a check valve.

Gasoline is fed by gravity to the car-

buretor from this auxiliary tank. A tube connected with the top of the chamber on this tank is also connected with the air inlet on the carburetor. This feature utilizes the gas vapor given off in the tank and the manufacturers claim it makes for a large saving in fuel and a further addition to the explosability of the fuel mixture.

The illustration on this page shows the complete Church system, as well as sections of its few parts and the simplicity of their construction.

The makers claim that in recent tests conducted under the direction of officials of the American Automobile Association, it was shown that it required less than 10 seconds to get the engine running after the auxiliary tank had been completely drained.

It is stated that as the whole system is completely closed at all times, except when filling tank, there is no possible chance of trouble due to the collection of dirt in the fuel line. A positive feed of fuel to the carburetor is insured at all times under any conditions of grade or engine speed. With this system the makers say that the auxiliary tank may be raised to a point from 40 to 50 feet above the main fuel tank and still be fed with positive exactness; the only change being required is that the air relief valve be set to blow off at a higher pressure.

RAILWAYS WILL ADOPT UNIFORM SAFETY SIGNALS.

The Chicago and Northwestern Railway will be one of the first to adopt and install the latest safety devices that have been approved by the American Railway Association to prevent accidents at grade crossings.

At the meeting of the association, held last October, it was voted to adopt a uniform system of signaling at crossings and a uniform combination of colors for crossing poles and signs so that motor-



Method of Guarding Grade Crossings Approved by American Railway Association.



Showing How Canadian Rookies Are Trained to Become 100 Per Cent. Efficient Fighting Units Before Embarking for the European Continent. Motor Cars Take a Prominent Position in the Military Tactics, the Cars Shown Above Being Chalmers, Which During the Day's Drills Cover All Kinds of Road and Hundreds of Miles.

ists throughout the United States will know the significance of the warnings wherever they are found. The recommendations of the special committee that reported at that meeting, which were adopted, were as follows:

The adoption of a circular disc, 16 inches wide, with the word "stop" painted in black upon a white background, which will be used by the crossing guardmen in all parts of the country instead of the

green and red flags formerly used.

The installation of uniform color of lights for night indications—all lights displayed towards the highway at grade crossings to be red.

Uniform painting of crossing gates with alternate stripes of black and white in order to make them visible to travelers along the highway at a greater distance.

A campaign has also been undertaken by the association to secure legislation in each state for the erection of uniform circular warning signs at the highway 300 feet on each side of every grade crossing, these signs to have "R. R." painted in black on a white background, together with a black cross. As the railroads do not own the ground on which these signs are to be erected, some legislation is necessary to secure the permission of the different towns to have the signs erected at the proper distances from the railroads.

The Chicago and Northwestern Railway has already equipped the crossing guards throughout its system with the circular discs and is also installing as rapidly as possible the other devices for this uniform system of safety at crossings.

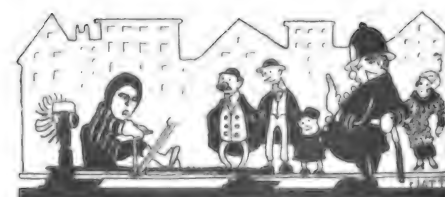
OLD REGAL ENGINE STILL IN SERVICE.

The many inquiries that the Regal Motor Car Co. have received concerning the whereabouts of the famous Regal "Plugger," which made a great record in

1910, caused the advertising department to institute a search of its history. It was found that its last public appearance was during Cadillac Week in Detroit, in 1913. Shortly after that the car was dismantled and only the motor can now be located. It is being used for general power purposes on Shore Acres farm, near Detroit, pumping water, running a cream separator, cutting ensilage and sawing wood.

SLED PROPELLED BY MOTOR.

The son of an automobile dealer in Vermont has contrived a very practical motor sled with which he can travel from 40 to 60 miles an hour either on ice or highways. A gasoline engine is mounted at the rear and operates a propeller similar to those used on aeroplanes. A steering wheel is used to control the movements of a single runner in front by which the direction of the sled is guided. The inventor is having a larger propeller made and when it is installed hopes to greatly increase the speed of his sled.



Banquet Given Race Winners

Resta and Aitken Receive Prizes at A. A. A. Banquet at the Chicago Auto Club

AT THE banquet in Chicago Dario Resta and John Aitken were crowned as the racing champion and runner up respectively, racing interests made several announcements that are important to the followers of the sport. The banquet was given by the American Automobile Association and held at the Chicago Automobile Club.

The feature of the occasion was the awarding of the various cash prizes and the Bosch trophy, illustration of which appears on this page. Aside from the highest laurels of motordom Resta is said to have won approximately \$20,000 in cash prizes, Aitken coming second with a sum about \$3000 less. A large part of this money was given by the Bosch Magneto Company and the Goodrich Tire Company.

At the banquet it was announced that the Bosch company will offer another

handsome trophy and cash prizes of \$2000, \$1000 and \$500 respectively to the racers coming in first, second and third in the 1917 season. James Allison announced that the Indianapolis race this year will be for a distance of 500 miles. Rumors to the effect that the Indianapolis Decoration Day classic would be run off at Cincinnati if the Indianapolis hotel managers did not agree unanimously to hold room rates at normal during the running of the event were discussed at the banquet.

Just before the banquet the Bosch Magneto Company issued its official record of points won by the various racers during 1916, upon which the company's awards were made. The tabulation is shown on this page.

Resta's former manager, Arthur Hill, is to take charge of a racing team of five drivers, who will pilot Hudson cars



The Bosch Trophy Awarded to Dario Resta as 1916 Champion.

Standing of Drivers in Contest for 1916 Bosch Trophy

Drivers	Metropolitan Trophy—150 Miles	Indianapolis Sweepstakes—300 Miles	Chicago Derby—300 Miles	Des Moines Speedway—150 Miles	Minneapolis Twin City—150 Miles	Omaha Sweepstakes—150 Miles	Tacoma Trophy—300 Miles	Cincinnati Inaugural—300 Miles	Indianapolis Harvest Classic—100 Miles	Astor Cup Race—250 Miles	Chicago Sweepstakes—250 Miles	Harkness Trophy Race—100 Miles	Vanderbilt Cup Race—234 Miles	American Grand Prix—403 Miles	Ascot (Cal.) Speedway Race—200 Miles	Totals
Resta.....	900	900				600					800		900			4100
DePalma.....			470	600	600		120									1790
Aitken.....					320			900	500	800	420	500				3440
Rickenbacher.....	600			170			800			420	220				700	2510
D'Alene.....		470	40					470	140							1120
Milton.....					90	170	420			10						690
Mulford.....		240		35		320				25						620
Christiansen.....		130	240		170											540
Henderson.....		22		320		90	70		15		70	80				667
Lewis.....			20	90			220		50		120					500
Galvin.....			80	20				240		45	260					645
Devigne.....	320									30						350
Hughes.....									260	15						275
Vail.....	170		50							220	10					450
Buzane.....							130	80								210
O'Donnell.....			130		55											185
Devlin.....	90						50									140
Klein.....							80		45							125
Oldfield.....		80														80
Toft.....						45		30								75
Halbe.....		20					40									60
Stringer.....						55										55
Adams.....	55															55
Cooper.....				55									470	520	360	1405
Wilcox.....		40									140		438			618
Chandler.....		25		15												40
Watson.....	35															35
Sorenson.....					35											35
Johnson.....		30														30
Gable.....			30							15						45
McCarthy.....			25													25
Muller.....					20											20
LeCain.....									120							120
Pullen.....									70						190	260
De Vore.....										30	50					80
Burt.....										25						25
Benedict.....											30					30
Weightman.....												240				240
Roads.....												130	140			270
A. H. Patterson.....													270			270
G. Ruchstett.....														100		100

during the coming season. Ralph Mulford will be the star driver, assisted by Ira Vail and Billy Chandler. The other two drivers are to be selected later.

HARTFORD AUTO SHOW IN BIG STATE ARMORY.

The Hartford Automobile Dealers' Association will hold its 10th annual show in the big state Armory in that city, which has a floor area of 50,000 square feet. Many new dealers have opened agencies in the city during the past year and as a result the demand for exhibition space has been so great that Manager Ben F. Smith says it is doubtful if there is enough to go around. The show will be held during the week of Feb. 10-17. Following is a list of cars exhibited:

Mercer, Jeffery, Simplex-Crane, Maxwell, Willys-Knight, Overland, Kissel-Kar, Chevrolet, Metz, Apperson, Oldsmobile, Allen, Velie, Atterbury trucks, Oakland, Chalmers, Cole, Liberty, Owen Magnetic, Franklin, Scripps-Booth, Ford, Winton, Hupmobile, Chandler, Mitchell, Cadillac, Dodge, Hal, Locomobile, Detroit Electric, Ohio Electric, Marmon, Packard, Packard trucks, Peerless, Stearns-Knight, Federal trucks, Hudson, Pierce-Arrow, Pierce-Arrow trucks, Paige-Detroit, Milburn Electric, Reo, Reo trucks, Studebaker, Buick, White, Baker R. & L. electric, National, Republic trucks, Vim, Selden trucks, Saxon, Autocar, G. M. C. trucks, Haynes, Auburn, Smith Form-a-Truck.

The board of directors of the International Association of Fire Engineers are to hold a meeting in Jacksonville, Fla., on Feb. 15, at which arrangements are to be made for the annual convention, which will be held in that city in October.

Six-Ring Circus On Trucks

New and Largest Circus On Earth To Be Conveyed Around Country By Means of Motor Trucks

THOSE persons who have so long looked askance at all motor haulage propositions, will be silenced this coming summer when they see a long caravan of motor trucks and trailers passing over the suburban highways carrying the enormous impedimenta of the new and largest circus on earth, that of the United States Circus Corporation, which will use a tent with a seating capacity of 25,000 people. There will be six rings in constant operation and the greatest animal show that was ever attached to a traveling circus.

Moving Is a Huge Task.

The steam engine and horse have for centuries been used to handle the enormous transportation and haulage problems that have always faced outdoor show managers and have been made to serve the purpose, although they were at the best a very cumbersome and makeshift method of moving about the large and heavy equipment of a circus, which presents difficulties second only to those experienced in war fare.

With the advent of the motor truck and automobile, Tody Hamilton, the late press agent for P. T. Barnum, the late Col. Cody and other circus men, predicted that the day would come when the great traveling shows would be moved from city to city by this new means of transportation. Years passed, however, and no steps were taken to adopt the motor truck, although it was recognized as a means of eliminating a large percentage of the loading and unloading and supplementary hauling that is at present necessary in moving a great circus.

First a circus has to be loaded upon a train of many cars or several trains. Upon arrival at the destination the freight yards might be some distance from the show grounds, with the result that the company had to keep many heavy draft horses and teams to move the equipment, in addition to those that are used in the street parades. The motor truck would eliminate all these extra trips, extra labor of unloading and loading and would also do away with much of the equipment that had to be maintained to perform this work.

War Sets Good Example.

Circus owners were skeptical, however, first as to the reliability of motor trucks and second as to road conditions. The experience of the Allies in France dissipated much of the prejudice there was against the endurance and serviceability of motor trucks, and then came the United States military operations along the Mexican border, of which more detailed and accurate reports were received.

These operations demonstrated beyond a doubt that the horse had been out-

classed in every respect in all kinds of service by the modern motor truck. The motor truck easily performed these services for the government, which are far more arduous and exacting than those that have to be performed in solving the transportation problem of a circus.

Investigates on the Border.

Frank P. Spellman, president of the United States Circus Corporation, decided to investigate their possibilities. He employed Roy K. Knabenshue, former aviator and engineer of the Wright Aeroplane Company, to go to the Mexican border and investigate and study the various motor trucks, trailers and the methods of handling them in caravans or army train fashion.

Upon Mr. Knabenshue's recommendations orders for 100 Kelly Springfield 3½-ton trucks were placed and also an order for 46 Troy trailers, all to be provided with Firestone Giant tires. The work of equipping this large truck and trailer train is now going on and it is expected that the big circus will take to the road some time in May. The company has mapped out its route for the next three years and has accurate and detailed information about every foot of road over which the caravan is routed. It will not depend, however, on reports in traveling, but will have an advance road repair crew, which will travel ahead of the circus to improve roads and strengthen bridges for the passage of the circus from one stand to another.

Power Winch for Emergencies.

Further precaution, however, is taken to prevent any delays by equipping each truck with a power winch to be used in emergency. The employees will be carried in the trailers, which will also be used for carrying equipment and such animals that do not have to be caged. The wild animals will be carried on the trucks in special bodies.

When the circus takes to the road in May it will represent an investment of approximately \$1,000,000. The rolling stock alone, including trucks, trailers and bodies, will cost over \$500,000, and the collection of animals, including horses, elephants, camels and wild beasts, which is the most complete in existence, was purchased from Frank C. Bostwick for \$150,000.

The bodies for all the trucks and trailers are being elaborately decorated with hand carvings and relief work, representing historical incidents, and will be the most spectacular ever designed. When all the vehicles are in procession together with the pleasure cars, allegorical floats and animals, the pageant will stretch out for a distance of nearly three miles.

Aside from the advantages and economies effected by reducing the number of loadings and unloadings, an enormous advertising value is gained. When the old fashioned circus came to town, the trains that bore it usually arrived in the night time at a siding or in a freight yard where the public had little opportunity to witness the detraining.

The new circus will pass by the homes of thousands and through hamlets and villages and suburbs adjacent to the show city and will be heralded along its way by the people. Thousands of people will in this way be apprised of the coming of the circus and it will greatly increase the attendance, so that in many cities a two-day stop can be made profitable, whereas heretofore one day in the city would serve to accommodate all the people that attended.

Each unit having its own propelling power the problem of manoeuvring about the show grounds will also be greatly simplified and will reduce the number of laborers, which has always been a large factor of expense in conducting a circus.

ATLANTA AUTO SHOW WILL BE BIG EVENT.

The automobile show at Atlanta, Ga., which will be held under the auspices of the Southeastern Automobile Show Committee, and under the direction of Robert H. Martin, chairman of the committee, will be the largest ever held in that city, or the South. A campaign for co-operation among all kinds of merchants in the city to make the week the occasion for their spring openings is meeting with success and will result in large crowds visiting Atlanta while the show is on.

CHARLESTON SHOW TO BE HELD IN TENT.

The automobile show at Charleston, S. C., which will be held during the week of Feb. 26-March 3, is to be staged in a huge tent in one of the public parks. It is being held under the auspices of the Charleston Advertising Club and the Chamber of Commerce Committee on Highways and Bridges and the automobile dealers of the city. L. Jack Oliver, W. King McDowell, J. H. Rast and Sidney S. Rittenberg constitute the show committee.

BRIDGEPORT'S SHOW IN TWO BUILDINGS.

The annual automobile show at Bridgeport, Conn., which will be held during the week of Feb. 19-24, is to be housed in the State Armory on Main street and the Casino on State street. The pleasure car and accessory exhibits will be located in the armory and motor trucks, delivery cars, motorcycles and accessories will be displayed in the Casino. Over 20,000 square feet of floor space is to be used.

Frontmobile Employs New Driving System

AMONG the new and novel models disclosed at the New York Automobile Show, the Frontmobile, sold by the Safety Motor Co., Grenloch, N. J., and made by the Bateman Mfg. Co. of the same city, easily ranked first in the interest of sightseers. It was conspicuous among the other hundreds of models because it was the only front drive car in the Palace embodying many principles that were new to the average motorist.

The Frontmobile has its power plant



Front Wheel Assembly, Showing Drive Shaft Connection and Other Details.

and all working parts under the hood in a compact unit, consisting of engine, clutch, transmission gearset, differential, gear shift, control members and radiator. Contrary to conventional design, there is no power mechanism back of the hood, which allows of the frame, particularly on the roadster, being dropped very close to the ground, as will be seen by the accompanying illustration of the stripped chassis. In this way extremely low centre of gravity is obtained, though the road clearance is 14 inches.

Generally considered, the chassis details do not exhibit very great departures from conventional practise of construction, though their arrangement and location is unique. Though unusual, the principles have, according to the maker, been indorsed by leading motor vehicle engineers.

In the words of the manufacturer of the Frontmobile "the front drive principle is correct and logical. One of the chief advantages is its freedom from skidding and overturning, due to the front



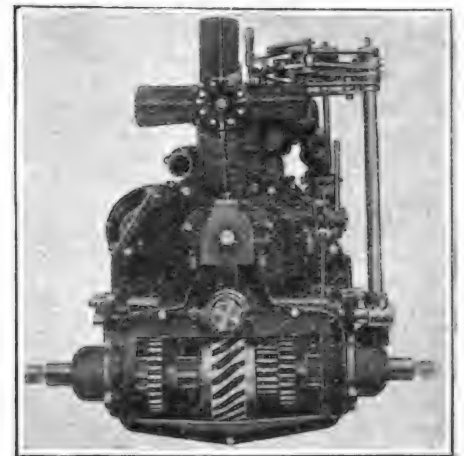
Three-Passenger Frontmobile Roadster, Which is Driven Through Front Wheels.

drive principle, which pulls instead of pushes the car."

Entering into details it is pointed out that the road clearance is greater than ordinary; that there is greater tractive effort—pulling out of deep ruts without danger of stalling engine or losing control of car; that sharp corners may be turned without perceptible loss of speed, due to the fact that driving is done on the same line as the wheels are turned; that driving and steering are all accomplished by the front wheels, making it much safer and easier for the operator to control, as the tendency is for the wheels to keep running in a straight path.

As compared with the conventional gasoline power plant, the Le Roi unit used has the components reversed; that is, the clutch, gear box, transmission, differential and drive shafts are in front of the engine. In the bell housing is a multiple dry disc clutch, the shaft of which carries a worm that meshes with a worm wheel floating on the differential housing. All transmission gears and the differential are carried in a conventional gear box, which is mounted transversely across the front of the car. The transmission gears run at axle speed, instead of engine speed, which reduces to a minimum the clashing when shifting gears.

Each drive shaft incorporates two universal joints, one being carried where the shaft comes from the gear box and another where it is connected directly to the centre of the front wheel by a



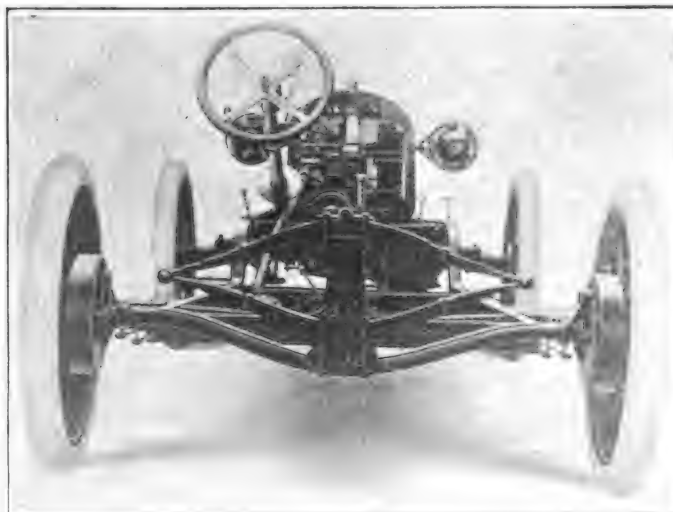
Front of Engine with Cut Away View of Gearbox and Differential.

knuckle pivot. In this manner a full universal action is provided for the driving member, permitting free steering. The front axle is of the full floating type, all the weight being carried on a dead axle and the power being transmitted by means of a live member.

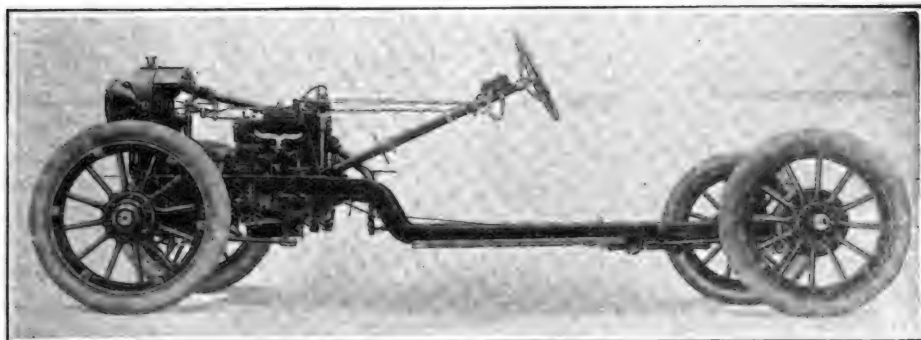
The control lever, which is hand operated, as will be seen in the illustrations of the unit power plant, is connected to a rocker shaft located in front of the transmission and passing through the instrument board to the right hand side of the steering column, which arrangement leaves the floor of the driver's compartment free of pedals.

The rear axle is a full floating type and is cambered, the wheels being mounted on ball bearings. It is a simple design and with spring hangers, brake and dust flanges weighs only about 30 pounds. All four wheels are cambered.

The spring assembly is an interesting feature. They are full cantilever type all around



Rear of Roadster Chassis, Showing Neat and Simple Spring Mounting and Clear Rear Axle.



Back of Power Plant Frame Is Dropped Nine Inches, Which Lowers Centre of Gravity.

on the touring car model and all parts are under tension, instead of compression which is designed to eliminate buckling or jerky effects. On the roadster full cantilevers are used on the front only.

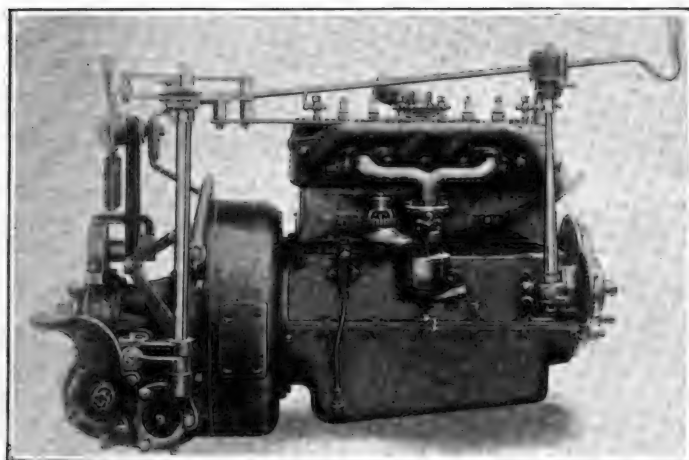
The engine is a four-cylinder Le Roi

assured before load can be applied. This construction also makes for easy running when coasting with gears in neutral position. The transmission is very accessible, it being possible to take apart all working parts and reassemble them in less than an hour's time. Likewise, the

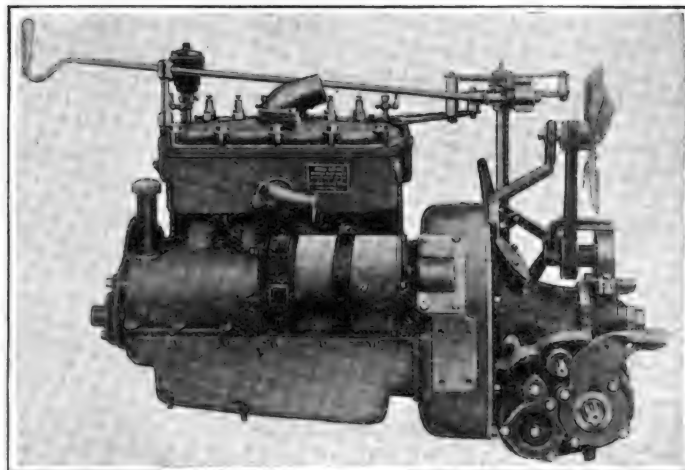
All Powerplant Parts Are Under the Hood

wheels are wood artillery type and carry 32 by 3½-inch Goodyear oversize, straight side tires on demountable rims. The tread is 56 inches.

The wheelbase of the Frontmobile models is 112 inches, and the complete line now offered consists of a five-passenger touring car with streamline body and individual adjustable front seats, a three-passenger low-down roadster and a 1000-pound light delivery wagon. The



Carburetor Side of the Le Roi Four-Cylinder Power Plant Used in Frontmobile.



Right Hand Side of the Power Plant, Suggesting Compactness of the Unit.

model C, 3½ by 4¼ inch, high speed, L head block type, developing 26 horsepower at 2250 revolutions per minute. The action of the valves follows conventional practise, with mushroom push rods and rather large diameters. The lift is moderate and adjustment is provided for clearance. The timing gears used are helical type.

Cooling is by the thermo-syphon system and there are no less than 14 openings between the cylinders and cylinder heads through which the water circulates, the head being made detachable. Lubrication is accomplished by the combination pump and splash system. A sight feed is located on the dash.

The carburetor is a Schebler automatic model R with hot air drum and dash control assembled, with gasoline feed of the gravity type. Battery ignition with a Connecticut distributor and coil is used, while the starting and lighting equipment consists of an Allis-Chalmers motor generator driven by chain.

The transmission has been described in some detail in the foregoing, except to state that it is a selective three-speed forward and reverse type and that due to the floating feature of the worm gear thorough oiling of the transmission is

wheels and shafts are very easily removed.

Two sets of brakes, service and emergency, operate on 12-inch drums on the rear wheels and are actuated by a horizontal hand lever located on the left hand side of the steering column. The

touring car and roadster are priced at \$1000 and the delivery wagon at \$900.

The standard equipment included in the prices of the pleasure cars consists of one-man top and cover and side curtains, slanting windshield, electric horn and tool kit, including pump and jack.



Five-Passenger Frontmobile Touring Car—Extra Tires Are Carried Underneath Rear on All Models.



Special Majestic Model with Victoria Top.

ONE of the new cars at the New York automobile show that attracted much attention because of its distinctive appearance, was the Majestic Eight, the product of the Majestic Motor Co., Inc., New York, N. Y. The models on display had all the usual equipment of high grade cars and in addition several features that are distinctive with the Majestic alone.

Lines Are Distinctive.

The general appearance of the car was striking, outstanding features being the rounded radiator, the special design headlights with bright and dim bulbs, the sweeping lines of the body and the treatment of the interior. The back of the front seat contains a mahogany paneled compartment for storage of dusters, lunch boxes and the like. On either side of this compartment are two smaller ones, that at the right being fitted with a solid food and vacuum ice container, while that at the left is equipped with a vacuum bottle and drinking cup and a cigar lighter. What will appeal to tourists is the fact that the door of the main compartment is on lock hinges, so that it may be raised to form a lunch table while the car is running.

Other details that will appeal to experienced motorists consist of a cushion foot rest, a lady's toilet set and a handsome robe rail. Another detail of ultra modern refinement is that the tonneau carpet is backed with water proof material, so that in wet weather it may be turned uppermost to save the carpet.

Compartment in Instrument Board.

The instrument board is another interesting feature, it having a large compartment in which to store guide books, maps, goggles, gloves and similar touring equipment. The board is of mahogany and carries a speedometer, ammeter, oil pressure gauge, eight-day clock, ignition and lighting switch. The horn button is mounted on the top of the steering column. There also is a spotlight and a dash and trouble light.

The Majestic line at present consists of a five and a seven-passenger touring car and a convertible four-passenger club

roadster with decided whaleback rear construction, all three models being priced at \$1650. In addition there is a special Victoria job that sells for \$2500 and a convertible touring sedan that is priced at \$3500. The Victoria model is shown on this page.

Individuality is characteristic of all



The Majestic's Rounded Radiator.

Majestic bodies. The roadster is a racy looking job, giving the appearance of possessing great speed, which it does. As a two-passenger roadster it is comfortable enough for the longest tour with plenty of room in the extra seat compartment for storage of four suit cases,

Majestic Eight Chassis Many Excellent

bags and a large number of wraps. When converted into a four-passenger club roadster it becomes what the manufacturer terms a "Sociable Car."

Details of the Power Plant.

The chassis incorporates the Colonial eight-cylinder unit power plant. The engine is a straight V type, with cylinders cast en bloc, and the valves fully enclosed. Its size is three-inch bore and five-inch stroke, developing 28.8 horsepower according to the S. A. E. formula. The piston displacement is 282.7 cubic inches. A rugged but light crankshaft is carried on three plain bearings of liberal size, and the camshaft drive is by silent chain with an idler sprocket for adjustment of the triangular drive from the crankshaft.

Lubricant is circulated by the pressure system in which is incorporated a gear driven pump and a pressure gauge. Cooling is accomplished by the thermo-siphon system, the water jackets being large and judiciously located.

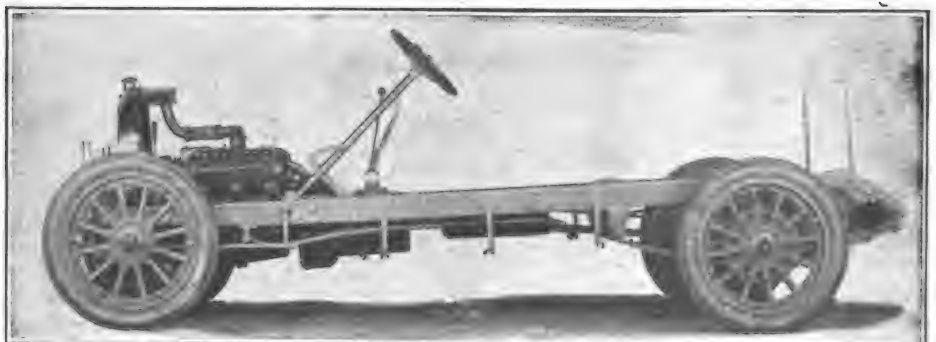
The carburetor is a float feed type, and gasoline is fed to it by means of a vacuum feed system from an 18-gallon tank carrier at the rear of the chassis.

The electrical installation consists of an Atwater-Kent single ignition equipment with hand control by means of a switch on the instrument board, and an Auto-Lite six-volt starting and lighting equipment.

Three-Plate Dry Disc Clutch.

The remaining components of the unit power plant consists of a three-plate dry disc clutch and a three-speed selective transmission gearset, in which ball and roller bearings are used.

The drive system is conventional and the work of well known manufacturers. The propeller shaft carries double universal joints, and the drive is by the Hotchkiss system, through the springs. The rear axle is of the three-quarter floating type, with spiral bevel gears and



The Majestic Stripped Chassis Discloses Strength.

Discloses In and Body Refinements

ball and roller bearings. The front axle is an I beam drop forging with ball bearings.

Unusually Long Springs.

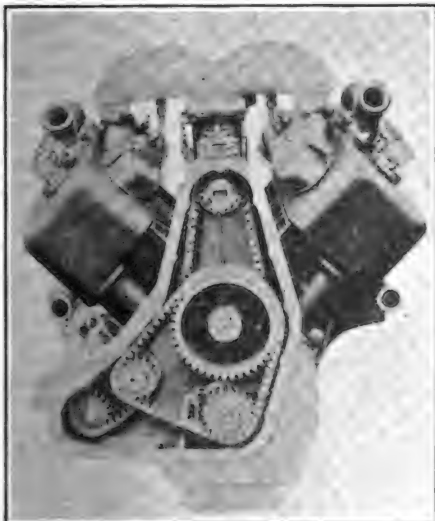
Semi-elliptic springs are used in the rear, they being $2\frac{1}{4}$ inches wide and 60 inches long, which is unusual length in cars in the Majestic class. The front springs are also semi-elliptics and are two by 40 inches. The spring equipment is a feature to which the Majestic company directs special attention, stating that they are the product of the leading spring maker in this country and make for the maximum riding comfort and safety on all kinds of roads.

The wheelbase of this Majestic model is 125 inches, and the running gear consists of special design wooden wheels, carrying demountable rims equipped with 32 by four-inch straight side cord tires.

The standard colors supplied are royal blue, dark green and black; the paint and varnish are applied by hand. The body is of sheet metal over a wood frame and is specially designed for the Majestic company. The upholstering of the bodies is in keeping with the general high grade make up of the balance of the car, the material used being of first quality.

Complete Equipment Supplied.

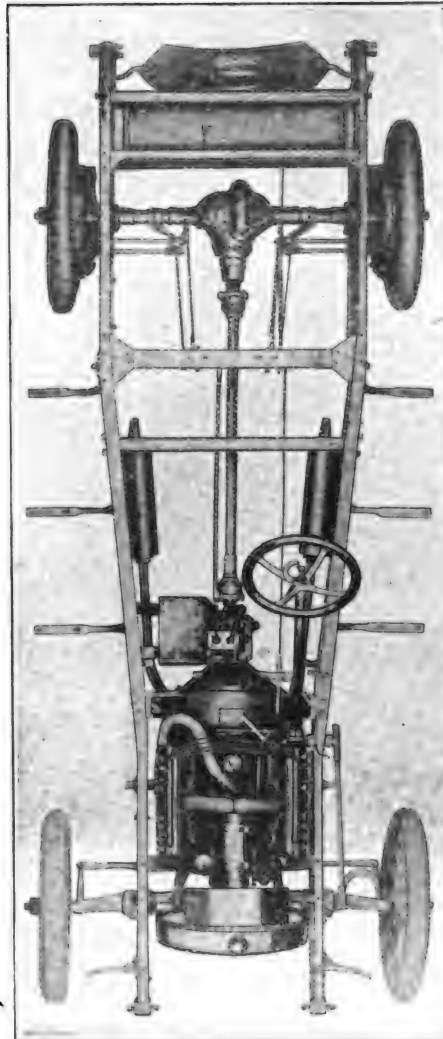
Standard equipment includes every detail generally supplied with this class of car and includes among other things a unique one-man top, a tilted windshield that is rain vision and has overlapping glass, a carrier for two extra tires, license brackets and a bumper.



Triangular Silent Chain Drive.

BARNEY OLDFIELD HAS NEW SPEED DEMON.

Barney Oldfield, who has been doing spectacular stunts in automobiles for many years, has come to the front again with a new speed demon which, he says, has all previous speed creations "backed off the boards." According to Oldfield his new steed, which is being built by Harry Miller in Los Angeles, will have a speed of 150 miles an hour, will be equipped with a periscope and will be so constructed that no matter what it



Chassis Strength Is Obtained by Use of Heavy Gussets and Cross Members.

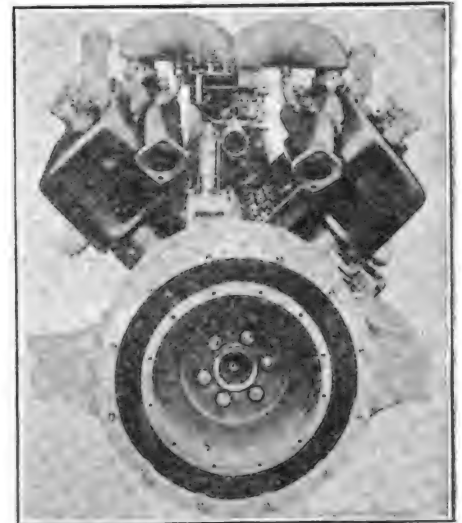
strikes the driver will be protected from any injury.

He will make his initial appearance in the new flier on one of the Florida beaches, where he will endeavor to lower the records he established in the Blitzen Benz.

SIGHTS ALONG THE LINCOLN HIGHWAY.

The Lincoln Highway, which is the best advertised route from San Francisco to New York City, is rapidly becoming popular with not only motorists, but also with people who like to do freak stunts to gain notoriety.

Two boys recently traveled the 3300 miles, walking and paying their expenses



Flywheel End of Engine.

from money earned by shining shoes on the way. One man walked the entire distance backward and another covered the distance by begging rides from passing motorists. Last summer a traveling magician passed over the route, pushing his shelter on wheels. A portable automobile repair shop also passed over the highway, the proprietor living on the business he picked up while en route.

The people who live along the route in the Middle West are expecting that within the next few years the route will be alive with all kinds of travelers, as it is not only the best known and most direct road from ocean to ocean, but for most of the distance the surface has been improved with modern surfacing.

PIONEER WILL AGAIN CROSS THE CONTINENT.

Ezra Meeker, who was one of the original pioneers that crossed the continent in the early days to settle on the Pacific coast and who recently traveled over 14,000 miles in his Pathfinder 12-cylinder "Schoonermobile," has started across the country again from Los Angeles in the same car. He will take the southern route over the Santa Fe trail to New Orleans and Jacksonville, where he will turn northward to Washington. He is visiting the capital, as he hopes to see the passage in Congress of the "Pioneer Oregon Trail" bill, in which he is interested.

NANTUCKET WILL NOT HAVE AUTOMOBILES.

The people on the Island of Nantucket, off the Massachusetts coast, have again voted to continue the ban on automobiles which was put on some years ago. Recently an attempt was made to authorize a secret ballot on the question at the town meeting in February, but the exclusionists won the day, aided by the protests of a large number of women who, despite the blizzard that raged on Jan. 27, turned out to vote down the proposition.

Photographs by
Joel Feder,
New York

Costumes Worn by Stylish Women In Motordom



The insert at the top of the page shows a charming and practical motoring outfit for stormy days. It consists of a great coat, with a popular swallow-up collar, in heather colored pontine faced with green satin, and a Scotch Laddie tam of the same water and dust proof material. The hat has a band of dark hunter's green satin and feathers of glossy green coque. The top of the tam is of hunter's green pontine. This model was designed by C. M. Phipps of New York City.


The view of the lady standing beside the car, which is an Owen-Magnetic, shows her wearing one of the latest models evolved for feminine motorists. The coat is of dark gray chinchilla cloth and has a deep convertible sailor collar and set on pockets. The extreme fullness of this model is indicative of the trend in styles for the far end of the winter.

At the left of the page is shown a dressy motor coat of maroon color velour delaine, with the waist line indicated slightly above the normal. Piping of grey duvetyne trims the cuffs and deep pouch pockets. The brass buckles, which hold in place the box pleats at the shoulder line, introduces a new detail novelty. This is an R. H. Macy (New York) model.

Many of the dressy motor coats seen in New York this winter are made distinctive by the detail finish on the pockets, collars and cuffs. At the right is striking model of that kind, the work of the United Fashion Co., New York City, which is made from tan broadcloth. The treatment of the pockets and cuffs, and the unusual belt, are particular features of this model.



OFFICIAL JOURNAL OF THE
NATIONAL AUTOMOBILE ASSOCIATION
DEPARTMENT OF THE



NATIONAL
HIGHWAYS
ASSOCIATION

TOURING
HIGHWAY
LEGAL DEPTS.

9 PARK STREET, BOSTON, MASSACHUSETTS

THERE is no section of the country where there is such a desire to legislate as in New England. Numerically, enough laws are annually enacted by the legislatures of these half dozen states to adequately regulate the entire country and possibly our insular possessions. The men who drew up the compact in the cabin of the Mayflower surely started a prolific law mill, for down through the vista of nigh 300 years we behold on either hand a wonderful yearly output of legislation which covers almost every idiosyncrasy and need of the human race. And the year 1917, A. D., will be no exception to the general rule, at least in so far as motors and motorists are concerned, if the legislation already petitioned for is enacted into law.

In order that our readers may become acquainted with these legislative activities, we present here the gist of some of the more important of the petitions for new laws now demanding consideration and determination by the legislatures of the several New England states.

MASSACHUSETTS.

Registration Fees of Motor Vehicles.

Massachusetts, as usual, heads the list with about three dozen bills. One of these seeks the reduction of fees for the registration of motor vehicles upon a more equitable basis, favorable particularly to owners of light cars, such as Fords, Chevrolets, Buicks, etc., but, generally, fees more in keeping with those charged by some 40 states of the Union. The petitioners for this legislation—The National Automobile Association—favors the universal adoption of a single fee tax measured either by horsepower or gross weight, this fee or tax to be in lieu of all other taxation upon this particular class of personal property. This would appear to be the fair and equitable method of

exactng motor vehicle registration fees; but as this opinion seems contrary to the rapidly developing penchant of the government to tax everything, not once, but as many times and under as many guises as it may be possible to create, the idea of a single fee or tax is regarded by many legislators to be out of joint with the times. Nevertheless, it may yet materialize in New England, as it has in New York. But if the bill above referred to should be enacted into law it would be a great boon to motorists of Massachusetts and might start in the New England states a movement for a corresponding change in the fees demanded there.

Unregistered Motor Vehicles.

In Massachusetts, and, doubtless, in other states as well, the principle is held that the operation of an unregistered au-

tomobile is deemed to be unlawful in every feature and shape of it. The vehicle is a trespasser, an outlaw upon the highways, and the operator and the occupants have no greater rights against persons who are lawfully using the way than they shall not recklessly or wantonly injure them or their property. The National Automobile Association has petitioned for legislation to nullify this harsh and unjust rule of law so that owners, operators and occupants of motor vehicles may recover for personal injuries and damages to property, even though the operator was unlicensed or the car unregistered, unless the violation of law contributed to the accident.

Safe Highways for Motor Vehicles.

Another unreasonably harsh rule of law prevails in Massachusetts to the effect that a highway that is reasonably safe for travelers with their horses, teams and carriages, is presumed to be safe for motor vehicles. The rule, of course, affects both foreign and domestic users of the ways. This presumption against motor vehicles is today absolutely unjust in view of the fact that five times as many motor vehicles use the highways as horse drawn vehicles, and especially in view of the enormous fees derived from automobilists, which now amount to more than a million and a half dollars. The National Automobile Association seeks legislation for the repeal of this law and further to compel cities and towns to keep their ways in a reasonably safe condition for motor vehicles.

A Commissioner of Vehicles.

There are two other bills which aim to establish a commissioner of vehicles, who shall have sole charge of the registering of motor vehicles, the licensing of operators and the regulation of them upon the highways. These bills, if en-

Coming

LEGAL STATUS OF THE MOTORIST.

IN THE next issue of the Automobile Journal the General Counsel of the National Automobile Association will begin a series of paragraphs and papers dealing with the legal status of the motorist and his motor in this country and in Canada.

It shall be his aim to divest these papers of legal technicalities and to make the issue of law involved and the decision thereon as simple as possible.

acted, would redound to the benefit of motorists, as well as to the general public, as it would enable the commissioner to devote his entire time, energy and foresight to advancing the interests of a class of citizens whose enormous contributions to the revenue of the state entitle them to serious and favorable consideration. The assertion is ventured that if during the past dozen years the motorists of each New England state had been under the jurisdiction of a single commissioner, today, in this small and geographically exclusive section of the country, motorists would for one thing be operating their cars under a New England registration certificate and a New England license, making it unnecessary in this small area to obtain a separate license and certificate for each state. The time is ripe for the motor officials of the New England states to get together and adopt reciprocal relations and privileges. It will indicate real progressiveness on the part of New England.

Irresponsible Automobile Owners.

It is generally conceded that there are many persons owning and operating motor vehicles upon the highways who are wholly irresponsible financially, and that in case of accidents due wholly or in part to their negligence it would be impossible to recover damages even should damages be awarded against them by the courts. Consequently, the sentiment is growing that owners and operators of cars should be required, in a measure, to make themselves responsible by either purchasing a bond or taking out a policy of insurance before being permitted to use the highways, and bills now before the Massachusetts Legislature have this object in view. It is along the line of the New Jersey laws recently declared constitutional by the United States Supreme Court. Much can be said for and against the proposition. It is only natural—and logical—in view of the enormous mass of laws in which they are now enveloped for motorists to inquire why they should be singled out as a class and be compelled to guarantee protection to the general public before using the highways, when owners and operators of railroads, street railways, horses and carriages, etc., are not required to do so. On the other hand, even motorists see advantages in the plan, as many of them are among the worse sufferers from irresponsible users of the highways. For this reason alone, therefore, there is a feeling that something along this line might equitably be worked out; something which would not make motoring prohibitive for the poor man, or weigh too

Free AUTO LAMP LIGHTING CALENDARS.

THE N. A. A. is distributing to its members an attractive Auto Lamp Lighting calendar, which shows at a glance the hour at which lamps on motor vehicles are by law required to be lighted. The association will, upon application, gladly send one of these calendars to any New England motorist without charge.

heavily upon him, in view of all that is already required of him. The question demands nice handling.

Removal of Obstructive Sign Boards.

Another salutary bill before the Massachusetts Legislature is that which seeks to protect the public using the highways by prohibiting any person, firm or corporation from erecting or causing to be erected, or in maintaining in places which are outside of the thickly settled portion of cities and towns, where buildings average less than 200 feet apart for the distance of a quarter of a mile, any object or structure which is so placed and is of such a size that it prevents persons using a public way from having a clear and uninterrupted view of the whole width of said way and of all other users thereon for a distance of at least 500 feet in both directions.

Rights of Way.

The question of establishing rights of way or rights of precedence for users of the highways in certain situations is also demanding consideration. From time immemorial the general rule in America has been that each user of a highway, whether on foot or driving a wagon, automobile or street car, is bound to use reasonably prudent care to avoid coming into contact with other users of the road; that neither is entitled to assume that the other will keep or get out of his way.

Sidewalks as Well as Roads.

Another set of bills is seeking the construction of a way or a sidewalk appurtenant to the highways for pedestrians. This idea will materialize in time, for surely pedestrians upon our highways are entitled to consideration. Their situation upon the roads is today not only an unpleasant, but a highly dangerous one.

Prison for Auto Thieves.

The stealing of automobiles is becoming so alarmingly popular among the "crooked" class of our citizens throughout the entire country that we are impelled to reiterate our past warnings that a motorist takes a serious chance when he leaves his car unattended for a longer period than half an hour. Some recent court cases have thrown sufficient light upon the methods of auto thieves to convince us that one class of them work in pairs. One man looks over a number of cars in a popular parking place and determines, if possible, which cars are unlocked or easy to make away with. He then reports to his confederate, who is usually some distance away, the number of his choice. The confederate deliberately walks up to the selected car, starts it, and is soon out of sight. The inventive genius of Americans ought to be able to create a locking device that will absolutely lock automobiles.

In the meantime legislation is sought in Massachusetts to prevent the stealing of automobiles, motorcycles and other motor vehicles by providing a punishment upon conviction of imprisonment in the state prison for not more than five years or by imprisonment in a jail for not more than two years. If such a measure will help to lessen in the slightest degree the rapidly increasing number of these larcenies, it surely should become a law.

NEW HAMPSHIRE.

Bonds or Insurance Policies for Motorists.

In New Hampshire the question of compelling motorists to furnish a bond, or take out a policy of insurance before being permitted to use the highways, is

under consideration. A bill provides that a person obtaining a registration certificate shall also have a certificate from some liability insurance company, to be approved by the commissioner of motor vehicles, that said applicant has procured liability insurance in said company in an amount not less than \$5000.

Another bill provides that no motor vehicle which is owned or controlled by a resident of

Vital Statistics for Motorists

Record of Accidents, Etc., in Massachusetts

SOME interesting statistics have recently been published by the Massachusetts Highway Commission relative to the number of automobiles and motorcycles registered during the past eight years, the number of persons killed and the number injured, and the work of the commission in suspending and revoking licenses, as well as suspending rights.

Year	Registrations		Persons		Licenses		Rights
	Automobiles	Motorcycles	Killed	Injured	Suspended	Revoked	
1908.....	18,052	1,917	13	486	51	44	..
1909.....	23,971	2,394	54	989	132	68	..
1910.....	31,360	3,370	77	963	198	90	..
1911.....	38,907	3,658	110	1,248	254	95	..
1912.....	50,132	5,034	142	1,962	325	190	..
1913.....	62,660	7,127	188	2,923	365	198	..
1914.....	77,246	8,161	229	4,010	521	231	34
1915.....	102,633	9,520	294	6,197	615	303	181
1916.....	136,809	10,713	315	9,131	641	514	232
Total.....	541,770	51,894	1,422	27,909	3,102	1,733	447



Hon John L. Bates, President of the National Automobile Association.

New Hampshire shall be registered until the owner or person controlling the same has obtained a permit wherein such owner or person resides. This does not apply, however, to manufacturers, or bona fide dealers in such vehicles. The evident aim of this bill is to enable cities and towns to collect registration fees. The bill also exempts from taxation motor vehicles owned or controlled by residents of New Hampshire, except manufacturers or bona fide dealers.

VERMONT.

Vermont also contemplates registration affecting motorists. There are four bills before its legislature.

"Cut Out" Muffler Cut Outs.

One of these bills prohibits the opening of the muffler cut out of an automobile or motor vehicle while such vehicles are being operated in a city or incorporated village or in a thickly settled part of a town.

Special Chauffeurs' Licenses.

Another bill relates to the issuance of operators' and special or professional chauffeurs' licenses, and the regulation of the operation of automobiles and motor vehicles.

Lights on All Vehicles.

And two other bills, real progressive ones, too, provide that every vehicle on wheels, except those propelled by hand, and wagons loaded with hay or straw, whether stationary or in motion on a public highway, shall have attached to it a light which shall be so displayed as to be visible from the front and rear during the period from 45 minutes after sunset to 45 minutes before sunrise.

MAINE.

Stopping Motor Vehicles.

A bill before the legislature of Maine provides that motorists shall come to a full stop when approaching or passing a street car which has been stopped to allow passengers to alight or embark; to shut off headlights upon approaching

street cars or teams in well lighted parts of city and town streets; to slow down and give a signal with bell or horn when approaching pedestrians upon a traveled part of a way; and to come to a full stop, when approaching a railroad track at grade crossing, and to remain stationary long enough to ascertain whether a train is approaching.

Lights on Vehicles.

Another bill requires all vehicles on wheels to carry lights; requires the operator or controller of a motor vehicle to give correctly his name and address when requested to do so by a police officer; and holds the operator or custodian to be the responsible and liable to a penalty.

RHODE ISLAND.

A new law regulating to motor vehicles and their operators in the State of Rhode Island went into effect in part on Jan. 1, 1917, and reference to the important provisions of it will be made later.

There is a bill before the Rhode Island Legislature amending the motor vehicle act of 1916, which stipulates fees for the registration of motor vehicles, which is nothing short of confiscation of property. This bill ought to be defeated, as it is entirely out of harmony with the registration fees charged in the other states of the Union. Motorists of Rhode Island should never permit the exaction of such registration fees as are demanded in this bill.

Some of the Work of the National Highways Association

The First Step in Photographing the United States

A. L. WESTGARD, director Transcontinental Highways of the National Highways Association, who will photograph the whole United States, has begun his work in New Mexico.

The motion pictures made by L. E. Taylor, photographer on the Combitone Pictures Corporation's record breaking automobile tour of America, will film New Mexico as no other series of pictures ever has shown it.

By the Hochstetter process of combination or combination toning, the scenic wonders of this most picturesque of states will be projected on the screen in all the glory of color—not the one color of an ordinary tinted film, but the multiple colors of this new process by which background, foreground, sky and middle distance receives each its appropriate shade and tone.

Pictures Cliff Dwellings.

This series of pictures, each one of which is complete in itself, is designed to show not only scenic wonders, but natural curiosities, resources, industries—in fact, every characteristic which makes one state differ from another. In New Mexico thousands of feet of film have been used on scenery alone, and as many thousands more on those remarkable relics of a by-gone age which are the admiration of travelers and a book of learning to scientists.

At the bottom of a canyon near Rito de los Frijoles, pictures were made of cliff dwellings and prehistoric caves, and a special picture of the Kiva or Estufa, as the native Indians call it. This is the sacred ceremonial chamber of the ancient cliff dwellers. It is situated half way up a high cliff and could only be reached by a long ladder climb. The cliff dwellers placed this, their holy of holies, midway between earth and sky, to guard it as well as was possible against an

enemy's attack from either below or above.

In Canyon de Mortenda more cliff dwelling pictures were made under Mr. Westgard's direction, not forgetting a view of an old trail worn 14 inches deep in solid rock by the moccasined feet of prehistoric Indians.

Yards on House Tops.

Of all the cliff dwellings, however, Mr. Westgard shows those of Acoma Pueblo to be the most wonderful. It is 20 miles south of the railroad and can be reached only over a rough, rocky mesa or a sandy valley, covered with gigantic monuments. Among these is La Mesa Encantada, or the enchanted Mesa, and on the next rock is the Pueblo Acoma. The storms of hundreds of years have piled up a slope of loose sand reaching 40 feet up the rock. Up this slope toiled natives with burros loaded with their provisions.



Francis Hurtubis, Jr., General Counsel of the National Automobile Association and Director General of New England of the National Highways Association.

It is the only way of reaching the top of the 350 foot rock on which they live. At the base the natives have their corrals to keep their stock. Their houses are two and three storied structures on top of the rock. The roof of the first story furnishes the front yard to the second story, and so the roof of the second story furnishes the front yard of the third. Those upper stories are reached by means of ladders. Agricultural pursuits and pottery are the main industries of the natives and Mr. Hochstetter, who is personally supervising the toning of what he believes to be the best films ever made of this character, says these scenes lend themselves with almost uncanny readiness to combination effects.

Wonderful Color Subjects.

No motion picture, no matter how faithful to life in its gradations of black and white, can do more than suggest color with objects with which everyone is familiar, such as houses, streets, ships, railroad trains, etc. The lack of color is hardly noticed. A peculiar mental process makes the picture seem life like. But when the motion picture is of something of which the colors are totally unfamiliar, then the lack is serious, and its presence mean a hundred fold enhancement both of the educational and the beauty value of the pictures.

To make full use of the color effects available in combination toning, Mr. Westgard has had the camera turned upon color wonders like the justly famous LaBajada Hill, near Sante Fe, the background and color effects of which are said to rival the Alpine scenery of Switzerland. He shows a Navajo family in front of their hogan, or hut, carding, spinning, weaving the rainbow like Navajo blankets; the red cliffs, north of the railroad near Gallup, and a

few thousand Navajo blankets-to-be, yet alive, in the form of great herds of goats.

Father Weber of St. Michaels.

The pilots of this expedition intend to show as much as possible of the human side of life in each state. So a special trip was made to photograph Father Weber at St. Michaels, and his Franciscan brethren.

Probably not one person in 100 ever heard of Father Weber, and yet he has done a wonderful work in the Navajo country. He was the originator of the Navajo language in character and in type, and has written both a catechism and a dictionary in that language. Mr. Westgard was greatly interested in the work done by the Franciscans among the Indians.

"They are entitled to profound respect," he said, in an interview. "Father Weber's only regret is the lack of ability to put the gospel into the Zuni Indian country. A few thousand dollars would enable him to extend the work among the Zuni Indians where Christianity is as yet practically unknown. The little that was once known is now almost forgotten, and the one Zuni church has fallen entirely in ruins."

If the beautiful combination pictures of all that is pictureable of this work do nothing else but bring a lifted hat from someone who appreciates what self sacrifice and courage are needed for such labor, they will have been well worth while.

Pathe, through which the wonderful combination pictures will be released, reports great interest among exhibitors everywhere in this unusual attempt to photograph everything worth photographing in the whole nation and put it forth with the added attraction of beautiful color effects. These pictures will soon be released for exhibition purposes.

National Automobile Association Will Help Tourists

YOU doubtless contemplate some touring during this year. Do you know the best roads, the most attractive and pleasurable routes, the points of interest along the way, what hotels and garages to patronize and what your trip will cost?

If not, write or call upon us regarding your touring. We can and shall be glad to advise you in all these problems, whether you are to travel North, East, South or West, into Canada, the West Indies or in Europe. We have now the most complete library of tour books, maps, records and route cards, etc., to be found in the country and we are daily adding to it. Our route cards alone cover more than 150,000 miles of highways. For the further convenience of our members we have provided accommodations at our head offices to enable them to examine or study the publications in our library. We are also planning the publication, at an early date, of an index

card containing the more important of our books, maps, etc., a copy of which will be sent to each member.

Query Department.

We wish to remind our members that we welcome not only any suggestions tending to help motorists and to improve motoring conditions generally, but that we shall be glad to answer through our Query Department, if we can, any questions which may be of interest to you. Address: Query Department, National Automobile Association, 9 Park street, Boston, Mass.

Lost and Found Department.

For the benefit of our members we have also a department which will do everything possible to assist in recovering lost cars, articles, etc., and members wishing to bring these matters to our attention will address: Lost and Found Department, National Automobile Association, 9 Park street, Boston, Mass.

Rules for Drivers and Pedestrians

FOR the instruction of all motorists and especially for the members of the National Automobile Association, we insert here some advice succinctly stated and recently promulgated by the police commissioner of New York City, Arthur Woods, which is worth bearing in mind.

Drivers Have a Right to Expect.

1. That all persons be prevented from hooking on behind vehicles or stealing rides on trolley cars.
2. That pedestrians do not cross heavy traffic streets at other places than regular street crossings.
3. That persons crossing streets do not carry umbrellas or bundles, so as to obstruct their view.
4. That persons do not read newspapers while crossing the street.
5. That persons walk on the sidewalk instead of on the roadway.
6. That persons in crossing the streets keep their eyes open.
7. That persons do not alight from street cars while in motion.

Pedestrians Have a Right to Expect.

1. That drivers refrain from speedy and reckless driving.
2. That drivers refrain from operating vehicles with faulty steering gear, without adequate brakes or sound signal, without lights, or with dazzling lights.
3. That drivers do not operate vehicles while intoxicated.
4. That drivers of vehicles give the proper signal when about to stop, start or make a turn.
5. That drivers do not pass or approach within eight feet of a surface car which has stopped to discharge or receive passengers.
6. That drivers keep to the right.
7. That drivers in passing or overtaking vehicles keep to the left.
8. That drivers keep to the right of car stop, safety zones, safety aisles, etc.
9. That drivers exercise proper precaution in approaching street intersections.
10. That drivers do not leave horses unguarded or unattended on the streets.
11. That drivers do not leave vehicles alone on the street, without brakes properly set.
12. That drivers hold the reins properly in their hands and keep their eyes open.

Both Drivers and Pedestrians Have a Right to Expect.

1. Laws that shall insure safety and as rapid progress of vehicles as is consistent with safety.
2. That no driver be permitted to operate unless he is competent to do so.
3. That a speedy or reckless driver be promptly summoned or arrested.
4. That the number of the car of such driver be taken and promptly reported if the officer is unable to apprehend the driver.
5. That in every accident a list of proper witnesses be taken.
6. That every driver charged with intoxication be immediately examined by a police or ambulance surgeon as to his condition.
7. That patrolmen on post notify the owners of garages and stables of measures being taken by the police to prevent accidents.
8. That in each accident, however trivial, the police officer on post be particular to examine the brakes and steering apparatus and report on it.



COMPRESSING SPRINGS.

(Figure 305.)

One of the most exasperating things that the amateur automobile repairer has to deal with is the matter of compressing springs. For instance, the valve springs in an ordinary L head motor are usually hard to get at and require compressing before the valve pin can be put into place.

The following method will be found very practical for attaching wires to keep the spring compressed: Select two iron washers large enough to equal the outside diameter of the spring to be compressed and cut slots about $\frac{1}{4}$ inch wide, as shown at B. Place these washers on each end of the spring, having the slots pointing upward, and then place in a vise and screw up until the spring is fully compressed.

Now bend two wires in the form shown at A. These should be heavy enough to hold the spring tightly, and the bent over ends should be just long enough to hook over the coil of the spring. The ends of the wires should be bent toward each other so that the tension of the spring does not slip them off. The sketch shows about the proper proportions and angles.

One of these hooks may now be inserted over the compressed spring through the washers. Turn the spring around, screw up on the vise and hook on the other wire. The spring will be held fully compressed by the two wires, as shown at D, which may be easily slipped off when the spring is in place, if the hooks have been properly bent.

Save the washers and hooks for the next time.

REPLACE LOOSE NUTS.

(Figure 306.)

In going over the car to place it in condition for summer driving, remove those nuts that have been failing to do their duty and helping to spoil your pleasure in the past by unscrewing at every opportunity. Put them in a vise and with a hack saw split them down through the centre, as shown in the illustration. Give them a good strong blow with the hammer and replace. You will find that each one has been made into a lock nut, and will cause little trouble in the future, staying securely in position.

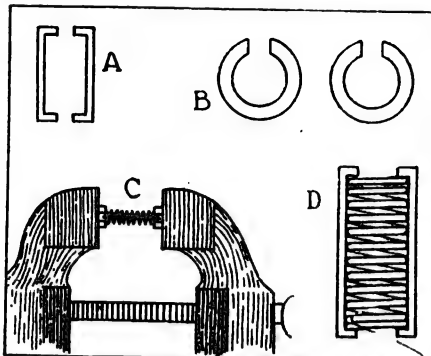


Fig. 305—Practical Suggestion for Compressing Valve Springs.

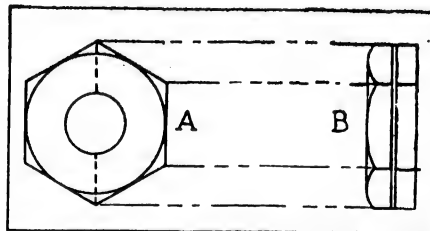


Fig. 306—Illustrating How to Make a Simple Lock Nut.

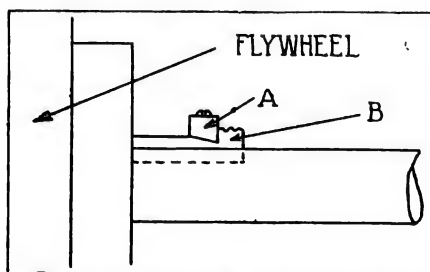


Fig. 307—Removal of Broken Key.

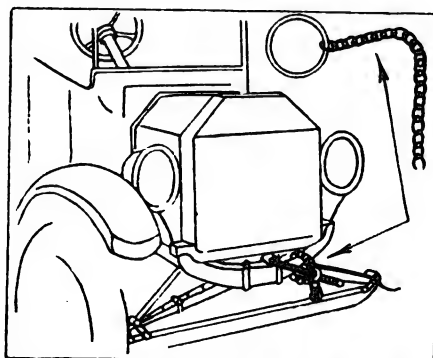


Fig. 308—Simple Chain Lock.

REMOVING BROKEN KEY.

(Figure 307.)

Once in a while the head of a key, by rough usage, breaks off while it is still in its place. Although the key may not be seated very firmly, the removal becomes a problem. Try the method used in our sketch; it may help in its removal.

About $\frac{1}{4}$ inch from the end, or about where the head began, file a groove across the key at right angles to it and about $\frac{3}{32}$ inch deep. Fit into this groove a piece of steel, as shown in the cut, screwing same to key.

This new head will give much greater purchase than could be obtained with clamps, and does not materially effect the strength of the portion of key remaining. It will be a good plan to throw away the key after removing and replace with a new one.

SIMPLE CHAIN LOCK.

(Figure 308.)

Nothing could be simpler for locking the automobile to prevent theft than a piece of chain with a large ring forged to it and a common padlock. It answers the purpose and may be used for a general utility tool. A hitch around the gear lever, or around one of the wheels through the axle, or even around or over the starting crank, as in the illustration, will keep the car from being used by an unauthorized person. In selecting the padlock to be used care should be taken that it has a close fitting bar, as a loose fitting one may easily be "picked" with a penknife inserted along side it.

CUTTING TUBING.

A hacksaw used for cutting brass tubing, or thin, hard brass sheets, very quickly loses its usefulness and its teeth. Two hack saws set side by side in the frame with their teeth pointing in opposite directions, will usually overcome this difficulty and give a cleaner, though a wider cut.

Bent copper wire can easily be straightened by gripping one end in a vise and the other end in a pair of pliers. The operation consists of simply drawing the wire taut with a jerk. Hammering has a tendency to flatten it.

OLD CASINGS.

(Figure 309.)

Don't throw away or junk your old casings. It is often possible to make two old casings do the work of a new one.

Cut off the beads of the old casing and with a sharp knife separate the fabric from the rubber covering. Put the end of the fabric in a vise and with a pair of pliers grasp the covering firmly and pull it off all the way around the old casing. The fabric which you have left is filled with a rubber preparation and you will find that it makes an excellent inside blow out patch for quick repairs.

Instead of separating the rubber covering from the fabric you might separate the tread from the rubber covering. Cut this into pieces, about eight or ten inches long, insert eyelets along the edge and you will have an excellent boot for lacing over the outside of a tire.

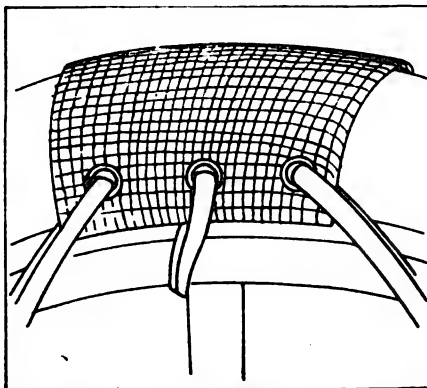


Fig. 309—Tire Boot Made from Section of Old Casing.

CUTTING ON THE BIAS.

(Figure 310.)

The Goodyear Tire and Rubber Co. say that in their repair school fabric cutting on the bias is done with a wet knife instead of the old methods of cutting with shears. A straight edge, like the one shown in the illustration, with blocks having 45-degree edges nailed on either end, is fitted to the edges of the table. A simple but very effective device.

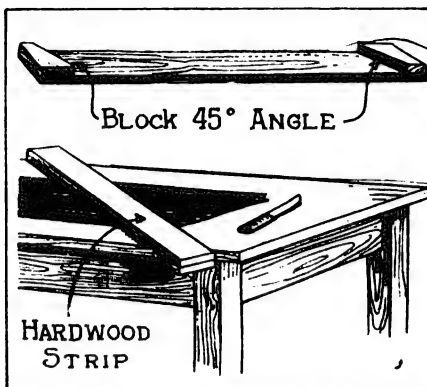


Fig. 310—Practical Method of Cutting Rubber on the Bias.

THOSE SMALL PINS.

(Figure 311.)

One does not realize until he begins to reassemble his car how many small screws and pins have to be replaced in out of the way places. The sketch shows a solution of the matter, utilizing a soda straw, which has been pinched on one end, to replace a valve pin. The same method may be used in replacing small cotter pins or screws with small heads.

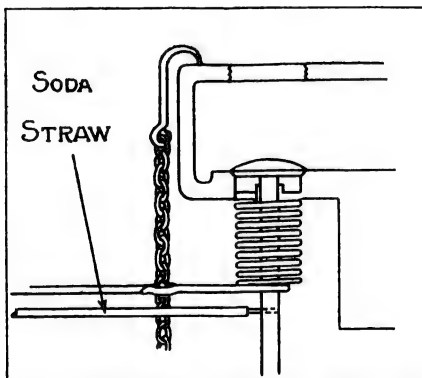


Fig. 311—How to Use Soda Straw to Insert Small Pins.

SHAPE OF OIL GROOVES.

(Figure 312 B-C.)

Few repair men realize the great importance of oil grooves in a bushing. The shape plays just as important a part as does the groove itself. The proper function of an oil groove is to distribute the lubricant over the surface of the bearing and to form a path for the oil to traverse, in most cases, the length of the bushing. It is, therefore, important that the oil groove distributes the oil rather than scrapes it off.

At B in our illustration is shown the end of a bushing in which the oil groove having sharp edges is very liable to scrape the oil from the shaft. At C we see the method of smoothing off the corners of the groove to properly distribute the oil.

MAGNETIZED TOOLS.

Rub one of the poles of a strong horseshoe magnet over the end of a long screw driver, which will become magnetized. You will be surprised at the great number of useful things you are able to do with a magnetized tool. Pins may be put in place, screws entered in inaccessible positions or pieces of iron and steel picked out of a gear case or engine.

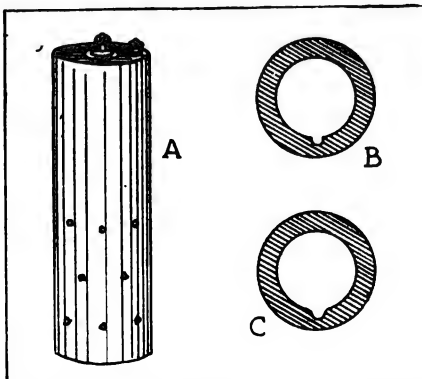


Fig. 312—A, Illustrating How to Treat Dry Cell for Renewal; B, Incorrect Shape of Oil Groove; C, Correct Form.

RENEWING DRY CELLS.

(Figure 312-A.)

Modern methods of ignition and lighting have gradually displaced the use of the dry cell in this particular line. Inasmuch as some of the older cars, however, still require that type of cell, the following hint may save quite a little money for the owners of such machines.

Remove the paper cover from the battery and inspect same. If the zinc case is smooth and not badly eaten away by the action of the chemical, it will pay to adopt the following procedure:

With a quarter inch wire nail punch a row of holes through the zinc into the white inside case, about half way up the side of the battery and all around it. About eight or nine holes will be sufficient. Below and relatively between these holes punch another row, as before. The sketch clearly shows their relative positions.

After punching about three rows of holes place the battery in a solution of sal ammoniac and water. This solution should be mixed so as to contain rather more sal ammoniac in proportion to water than is usually used for wet batteries. The mixture should cover the top row of holes punched, but should never reach to the top of the battery. After the battery has stood in this solution for about 12 hours, take it out and replace it in its paper cover.

Batteries treated in this manner will sometimes last three or four months when used intermittently. Of course, some will so depreciate in their first using that this procedure will not bring any results.

Save the sal ammoniac solution for future use. It will last quite a long time if kept well corked.

One of the first things that bothers the novice when painting his car is the matter of getting a good line in color on the paint. An amateur will find it very difficult to make a regular, smooth and even width line with the ordinary painters' lining brush without many weeks of practise.

An ordinary draughtsman's ruling pen can be used for this purpose and will give a result equal to the lining done by an experienced painter. Water proof ink for use with these pens may be purchased at any draughtsman's supply house, though most kinds of paint can be used in the pen.

It is often desirable to use paraffin on the automobile in various places, such as the terminals of the storage battery. The most convenient way to use it is in its liquid state, but to liquefy it the paraffin must be heated, and it cools rapidly. The following method will work out to advantage in most cases.

Fill a pan with boiling water and place in it a tin can that is about one-quarter full of gasoline. Shave the paraffin up into the gasoline, as much as can be dissolved. This mixture can be used successfully with a brush and will take an hour or so to harden. Keep it away from naked flame.

Road Funds Are Apportioned

Secretary of Agriculture Has Set Aside \$10,000,000, Less Expenses, for Road Work

Under the terms of the Federal Aid Road Act, the Secretary of Agriculture has apportioned \$10,000,000 to aid the states in the construction of rural post roads. Three per cent. of the appropriation for the fiscal year ending June 30, 1918, has been deducted for administration expenses, leaving \$9,700,000, which is to be divided among the states as follows:

State	Sum
Alabama	\$208,297.80
Arizona	187,027.04
Arkansas	165,378.20
California	302,127.84
Colorado	167,380.28
Connecticut	62,180.88
Delaware	16,368.74
Florida	111,952.54
Georgia	268,658.96
Idaho	120,927.00
Illinois	441,852.46
Indiana	271,495.24
Iowa	292,351.20
Kansas	286,414.80
Kentucky	194,942.82
Louisiana	134,949.82
Maine	96,908.00
Maryland	88,094.44
Massachusetts	147,701.90
Michigan	291,567.44
Minnesota	284,788.12
Mississippi	177,811.68
Missouri	239,440.82
Montana	196,574.38
Nebraska	213,541.62
Nevada	128,796.60
New Hampshire	41,993.24
New Jersey	118,425.36
New Mexico	157,475.62
New York	501,440.54
North Carolina	228,763.84
North Dakota	152,286.12
Ohio	373,810.84
Oklahoma	230,278.00
Oregon	157,374.74
Pennsylvania	461,288.84
Rhode Island	23,331.42
South Carolina	143,615.28
South Dakota	161,892.04
Tennessee	228,306.96
Texas	588,855.62
Utah	113,900.30
Vermont	45,688.94
Virginia	199,321.42
Washington	143,768.56
West Virginia	106,540.92
Wisconsin	256,722.14
Wyoming	122,898.64
Total	\$9,700,000.00

The money is apportioned on the basis of one-third in the ratio of the area, one-third in the ratio of the population and one-third in the ratio of mileage of rural delivery routes and star routes in the different states. It is the second appropriation made under the new act, the first being \$5,000,000.

Next year's appropriation will be \$15,000,000; that for 1920, \$20,000,000, and that for 1921 \$25,000,000. In addition, \$1,000,000 is appropriated each year for roads in national parks.

DELAWARE CLUB WILL FIGHT AUTO GRAFTERS.

The Delaware County Automobile Club of Philadelphia has inaugurated a cam-

paign against constables and justices who extract money from innocent motorists in the form of fees and fines levied on trumped up charges.

There were 2500 members present when President Joseph H. Weeks opened the campaign. In speaking of the conditions that have forced the organization to take action, he said:

We are out to get the grafting constable and you may put it down that we will. Too many of them are getting easy livings by hauling in autoists on petty and often framed-up charges. We intend to place agents on the roads in Pennsylvania to have these men reported and dismissed from their jobs. On the other hand, we do not intend to stand for grafting on the part of members of our own club. We shall not stand for law suits for damages against the state or individuals for damages unless it is clearly proven that they have a right to take such action. Members who attempt this sort of thing will be expelled from the club.

HUPMOBILE CAPITAL TO CAPITAL TOUR ENDED.

The Hupmobile that recently returned to Washington, D. C., after visiting the capital of every state in the United States, covered more mileage in four months than the average car does in four years.

The tour as an endurance and reliability test was a big success, but it was also looked upon as a great demonstration of the touring possibilities in this country. The passengers found little difficulty in obtaining supplies or accommodations, although they traveled in every section of the country and at times had to take the routes off the main line of travel. The car and its load weighed 4150 pounds and in some sections where the roads were inundated or composed of gumbo mud, the going was bad.

After the tour was ended the car was driven to New York City, where it negotiated Ft. George Hill on high and was later driven on an economy test from Albany to Buffalo, a distance of 201 miles, making an average of 18.96 miles per gallon.

FEDERAL ROAD MONEY IN NEW HAMPSHIRE.

Frederic E. Everett, commissioner of highways of New Hampshire, in his annual report suggests three projects for the use of the state's share of the Federal aid road money.

The routes selected for improvement are all in sections where motor travel is very heavy in summer. The commissioner would use the money to rebuild a section of the shore route to Seabrook and Hampton Falls, on the main highway from Newburyport to Portsmouth. Another suggestion is that a part of the South Side road in Marlborough be rebuilt, and a third that a piece of the road on the East Side route in Colebrook, near Dixville Notch, be rebuilt. These projects have been submitted to the Federal authorities according to law.

ELGIN CAR TAKES LEAP OF 36 FEET.

A stock Elgin Six roadster, weighing 2150 pounds, was given a severe test for stamina and strength in Chicago recently before a great crowd. The demonstration was of such a spectacular nature that moving picture men were on the scene to film it.

The test was held in Grant Park Driveway on the lake front. An inclined hurdle, 14 feet long and rising to a height of 14 inches, was placed in the middle of the road. The car was started from a point about 300 feet back of the hurdle with the throttle wide open. When it came onto the hurdle the car was making about 50 miles an hour. The momentum threw it into the air five feet as it left the end of the hurdle and the rear wheels did not again touch until the car had jumped over 36 feet.



Just Before the Elgin Landed After Leaping 36 Feet.



FOOT ACCELERATOR.

The Bull Dog Foot Accelerator for Ford cars is a device whereby the gas is controlled by a foot pedal, leaving both hands free for steering. When the foot is lifted to apply the clutch, the gas is automatically shut off. The makers say that no mechanical knowledge is necessary for attaching it, which can be accomplished in 15 minutes time.

Manufactured by the W. H. Thomas Co., Spencer, Ia. Prices furnished.

SHOCK ABSORBERS.

The cantilever principle is taken advantage of in the construction of the Aitchandee shock absorbers. Its important feature, that the tension is different on the upward and downward thrust, is claimed to make the Aitchandee shock absorber efficient. The makers say that these shock absorbers save tires by preventing side sway and pounding. Vibration, which loosens up bolts and screws, is eliminated, as is rattling.

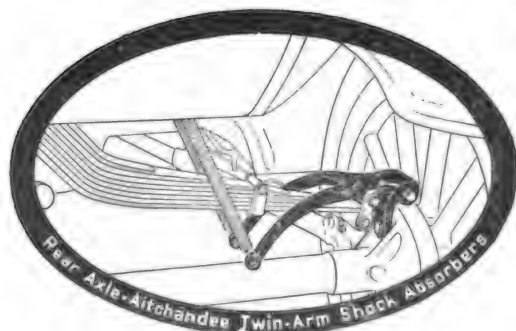
Made by the H. & D. Company, Inc., Goodland, Ind. Price per set of four, \$10.

SUIT CASE HOLDER.

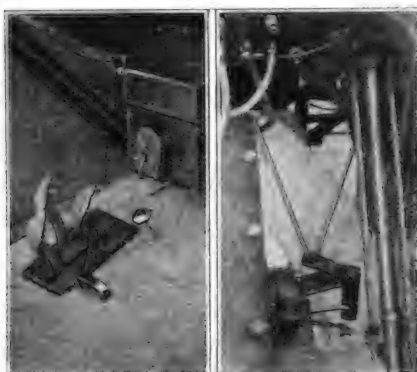
The Common Sense Suit Case Holder is made in two lengths and holds the suit cases upright on end in the holder, the lid of which is lined with a rubber strip, making it dust and weather proof.

The holder does not project from the car any more than the fenders and the lid is equipped with leather straps to hold coats, dusters, etc. These holders, when bolted to the running board, make a most complete and convenient baggage carrying device for touring.

Made by the Globe Machine and Stamping Co., Cleveland, O. Price for three suit case capacity, \$25; for four suit case capacity, \$30.



Aitchandee Shock Absorber.



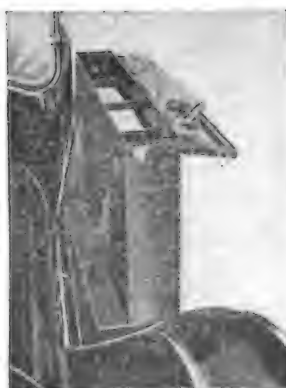
Bull Dog Foot Accelerator.



New Era Sparking Contact Points.



Casco Long Horn.



Suit Case Carrier.

CONTACT POINTS.

Contact points for replacing worn vibrator points, or points in magnetos, made from an alloy of materials which the makers claim are harder than platinum, are being placed upon the market under the name of New Era Indestructible Sparking Contact Points. The makers claim these points to be indestructible and offers a broad guarantee.

Manufactured by the New Era Spring and Specialty Co., Inc., 864-78 Woodward Ave., Detroit, Mich. Prices from 60 cents to \$1, according to sizes.

LONG HORN.

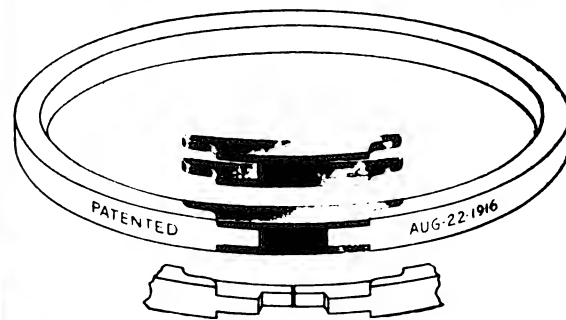
The Long Horn, shown in the cut, is both ornamental and durable. The contact between the diaphragm and the rotor is made by steel rollers inserted in the rotor, which is of hardened steel. Their action on the diaphragm gives a rolling tone peculiar to the Long horn. The volume of sound may be varied from a long, low rumble to a loud, sonorous crash, and continues after power impulses have ceased. It is finished in three styles: All black, black and nickel and black and brass. Total length, nine inches. Length of bell, 6 1/4 inches.

Made by Edward A. Cassidy Co., Inc., 30 East 42nd St., New York City. Price, \$5.00.

UNION PISTON RINGS.

Union piston rings are sold under a positive guarantee and are warranted to be efficient. They are made from individual castings of the finest quality of gray iron, and are ground to exact measurements after the union is inserted, so that a perfect fit will be obtained in the cylinder.

Made by the Union Products Co., Rockford, Ill. Prices ranging from \$1 to \$2, according to size. Write for further information and price list.



Union Piston Ring.

LIGHT TRANSFORMER.

The Savidge Light Transformer for Ford cars is claimed by the manufacturers to utilize the current furnished by the Ford magneto and furnish a brilliant, uniform light at all speeds. Its action is as follows: At low speed of the engine the "Savidge" transforms the current so as to produce a brilliant white light in the left headlight, at the same time providing a diminished light in the right headlight. This driving light in the left headlight remains practically constant at all speeds from low to high.

At approximately 14 miles per hour the light in the right headlight is automatically brought up to full brilliancy. On speeds above 14 miles per hour both headlights remain practically constant at full and normal brilliancy.

The Savidge Light Transformer is provided with two switches, as shown in cut. The first gives an "Off" position for the headlights, a "Dim" and a "Bright," while the second is used to control a spotlight.

Made by The Savidge Co., Indianapolis, Ind. Price, \$6.50.

ACCO CORK PRODUCTS.

Acco cork gaskets and washers made from a cork composition the makers say are impervious to oil, grease, gasoline or water. It is claimed that gaskets made from Acco cork composition will not grow spongy from use or soak up liquids.

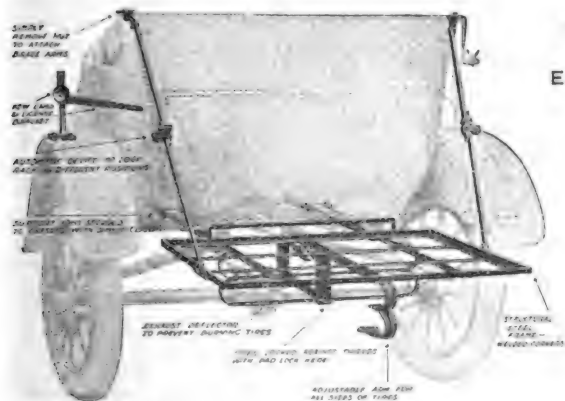
Acco Cork Composition may be purchased in 12x36 inch sheets, in three thicknesses—1/16, 3/32 and 1/8 inch, or made up by the manufacturers to sketches. A special Ford set of gaskets may be purchased.

Made by Armstrong Cork Co., Pittsburgh, Penn. Write for free samples and prices.

EXHAUST DEFLECTOR.

This is a small device made of heavy steel, finished in glossy black japan, baked on and ready to be attached to the exhaust pipe of the Ford car. Its purpose is to direct the grease, smoke and dirt from the exhaust on the road instead of on the car.

Made by the Corcoran Mfg. Co., Cincinnati, O. Price, 25 cents each.



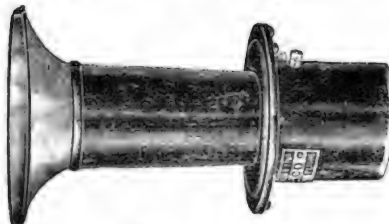
Combination Tire and Luggage Carrier.



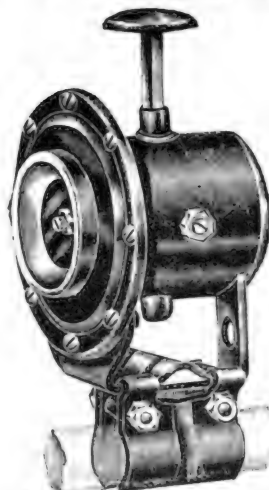
Savidge Light Transformer.



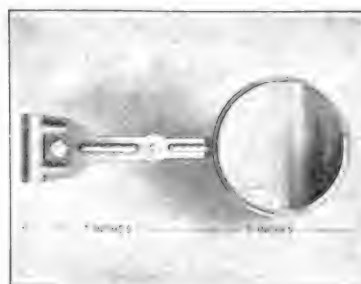
Transformer on Steering Column.



E. A. Mechanical Horn.



E. A. Electric Horn.



Hind View Mirror, Open Car Type at Left, Closed at Right.

E. A. HORNS.

The E. A. Laboratories are putting out an interesting line of hand operated and electrical motor driven horns. One of each is shown in our illustration.

The manufacturers claim that expert designing and manufacturing directions, coupled with years of uninterrupted experience, enables them to put out a horn of service at a low price. They produce horns in large quantities and of practically any size and description, whether motor driven or hand operated.

Manufactured by E. A. Laboratories, Inc., Broadway and Wythe avenue, Brooklyn, N. Y. Prices on application.

COMBINATION CARRIER.

Greene's Combination Tire and Luggage Carrier for Ford cars, as the cut shows, forms a convenient holder for a tire luggage without detracting from the appearance of the car. It is made of structural steel, solidly welded on corners with bar steel cross pieces. When used as a tire carrier it requires no straps to hold the tires in place and may be folded up against the back of the car. An exhaust deflector is provided to avoid danger of burning tires. Lamp and license bracket is removed from accustomed position and a new bracket is furnished to clamp on top of left fender. Weight, 35 pounds.

Made by the Hastings Mfg. Co., Hastings, Mich. Price, \$8.50 complete.

HIND VIEW AUTO MIRROR.

A neat and substantially built automobile mirror is being marketed under the name of "Hindview." It may be had in a variety of styles and finishes, the mirror being made of plate glass, either plain or lens. The lens mirror increases the field of vision about 50 per cent. without distorting the view. Illustration shows style A for open cars, and style C for closed cars.

Manufactured by the Kales-Haskel Co., Detroit, Mich. Write for prices.



Corcoran Exhaust Deflector.



COMING EVENTS

CONVENTIONS, ETC.

Pikes Peak Ocean to Ocean Highway Assn., National Annual Convention at St. Joseph, Mo. Feb. 13-14
National Auto Trade Assn., meeting at Hotel Gibson, Cincinnati, O. March ..

AUTOMOBILE RACES.

Los Angeles to Salt Lake City, Road. April ..
New York, Sheepshead Bay, Speedway, Metropolitan. May 19
Indianapolis, Ind., Championship, Speedway. May 30
Chicago, Ill., Championship, Speedway. June 9
Cincinnati, O., Speedway. June 23
Omaha, Neb., Championship, Speedway. July 4
Des Moines, Ia., Championship, Speedway. July 14
Tacoma, Wash., Championship, Speedway. July 28
Kansas City, Mo., Speedway. Aug. 4
Cincinnati, O., Championship, Speedway. Sept. 3
Providence, R. I., Championship, Speedway. Sept. 15
New York, Sheepshead Bay Speedway, Championship. Sept. 29
Kansas City, Mo., Speedway. Oct. 6
Chicago, Ill., Speedway. Oct. 13
New York, Sheepshead Bay Speedway. Oct. 27

AUTOMOBILE SHOWS.

Harrisburg, Penn., Automobile Dealers' Assn. Feb. 10-17
Hartford, Conn., Hartford Auto Dealers' Assn., at State Armory. Feb. 10-17
San Francisco, Cal., Motor Car Dealers' Assn., at Exposition Auditorium. Feb. 10-18
Toledo, O., Toledo Auto Shows Co., Terminal Bldg. Feb. 11-17
Bay City, Mich., at Armory. Feb. 12-17
Elmira, N. Y., Elmira Automobile Dealers' Assn. Feb. 12-17
Indianapolis, Ind., Indianapolis Auto Dealers' Assn., Steinhart Bldg. Feb. 12-17
Louisville, Ky., Louisville Auto Dealers' Assn., 1st Reg. Armory. Feb. 12-17
Sioux City, Ia., Sioux City Auto Dealers' Assn., at Armory. Feb. 12-17
Kansas City, Mo.; Kansas City Motor Car Dealers' Assn. Feb. 12-17
Camden, N. J., Arthur Colsey, Mgr., Feb. 12-18
Grand Forks, N. D., Automobile Dealers' Assn., at Auditorium. Feb. 13-15
Williamsport, Penn., at Armory. Feb. 13-17
Watertown, N. Y. Feb. 14-17
Peoria, Ill., Automobile and Accessory Dealers' Assn., at Coliseum. Feb. 14-17
Racine, Wis., Racine Auto Show Assn. Feb. 15-17
Albany, N. Y., Albany Auto Dealers

Assn., at State Armory. Feb. 17-24
St. Louis, Mo., Auto Mfrs. and Dealers' Assn. Feb. 18-24
Portland, Me., Portland Auto Dealers Assn., at Exposition Bldg. Feb. 19-24
Syracuse, N. Y., Syracuse Auto Dealers' Assn., at State Armory. Feb. 19-24
Grand Rapids, Mich., Automobile Business Assn., at Klingman Bldg. Feb. 19-24
Des Moines, Ia., Des Moines Auto Dealers' Assn., at Coliseum. Feb. 19-24
Duluth, Minn., Duluth Auto Dealers' Assn., at New Armory. Feb. 19-24
St. Louis, Mo., St. Louis Auto Dealers' Assn., at Overland Bldg. Feb. 19-24
Bridgeport, Conn., Coast Artillery Corps, at Armory. Feb. 19-24
Pittsfield, Mass., J. J. Callahan, Mgr., at Armory. Feb. 19-24
South Bethlehem, Penn., at Coliseum. Feb. 19-24
Springfield, O., Automobile Trade Assn. at Memorial Hall. Feb. 19-24
Flint, Mich., at Lake Side Park Coliseum. Feb. 21-24
Newark, N. J., Automobile Dealers' Assn. at First Reg. Armory. Feb. 24-March 3
Brooklyn, N. Y., Brooklyn Auto Dealers' Assn., 23d Regiment Armory. Feb. 24-March 3
Charleston, S. C., Automobile Dealers' Assn. at Marion Square. Feb. 26-March 3
Utica, N. Y., Automobile Dealers' Assn. at State Armory. Feb. 26-March 3
Omaha, Neb., Omaha Auto Show Assn., at Auditorium. Feb. 26-March 3
Wilkes-Barre, Penn., Auto Dealers' Assn. Feb. 26-March 3



AUTOS HELP CHURCHES.

Bishop Edwin H. Hughes told an audience at the Boston Baptist Social Union of the way in which the motor car had helped the churches. The bishop said: "Automobiles, like the bicycle craze and the early skating rinks, have caused Jeremiah's numerous progeny to lament that the hearse is pulled up to the door of the church, waiting for it to come and have a respectable funeral with an eulogy of its work in the past. But Jesus is pressing the automobile into his service. When I preached lately at my old church in Malden, where not one parishoner had a car a few years ago, the place looked like an ecclesiastical garage, and I have preached to 15,000 in California, where the congregation would not have been 1500 but for the auto."

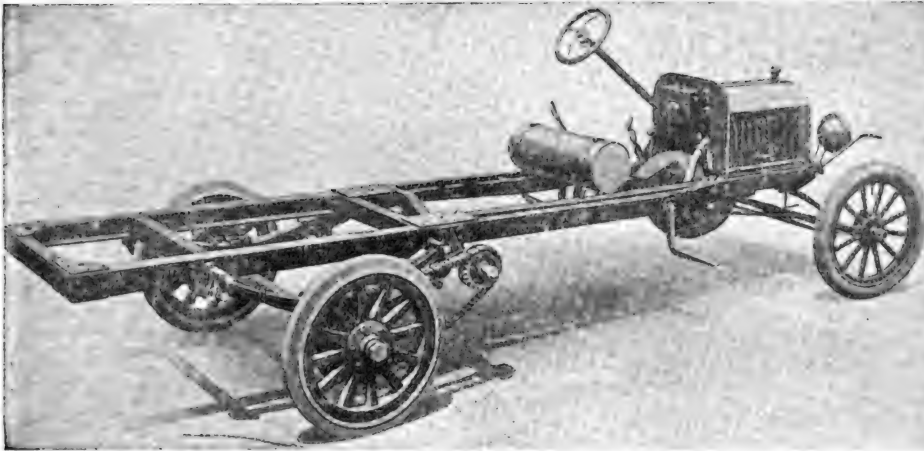
Atlanta, Ga., Atlanta Auto Trades and Accessory Assn., at Auditorium. Feb. 27-March 4
St. Joseph, Mo., Auto Dealers' Assn., at Auditorium. Feb. 28-March 3
Urbana, Ill., Automobile Trade Assn., at Armory. March 1-3
Boston, Mass., Boston Auto Dealers' Assn. and Boston Commercial Motor Vehicle Assn., at Mechanics' Bldg., Chester I. Campbell, Mgr. March 3-10
Washington, D. C., Middle Atlantic Motor Assn. at Union Bldg. March 3-10
Fargo, N. D., Gate City Auto Show Co., at Auditorium. March 6-8
Ft. Dodge, Ia., G. W. Tremain, Mgr., at New Terminal Warehouse. March 6-10
St. Joseph, Mo., St. Joseph Auto Show Assn., at Auditorium. March 7-10
Trenton, N. J., Trenton Auto Trade Assn., at 2d Reg. Armory. March 14-17
Davenport, Ia., Tri-City Auto Trade Assn., at Coliseum. March 14-17
Mason City, Ia., Automobile Dealers' Assn. at State Armory. March 14-17
Pittsburg, Penn., Auto Dealers Assn. of Pittsburg, at Motor Square Garden. March 17-24
New Haven, Conn., New Haven Auto Dealers' Assn., Hotel Taft. March 19-24
Cedar Rapids, Ia., Automobile Trades Assn. March 19-24
Calumet, Mich., Frank Ketchell, Mgr., at Coliseum. April ..
Stockton, Cal., San Joaquin Auto Trades Assn. April 4-7

AUTO POKER IN BAY STATE.

Automobile poker as played in Massachusetts is unlike the great national game; you can't draw to fill your hand or discard any poor fillers. The bet is first made and then the players wait upon the street for the first two automobiles to pass, one player taking the numbers on the register plate of the first machine to appear and the other those on the second machine. If a machine bearing No. 12,345 speeds by the first player feels he has the pot cinched with a "straight," but there is a No. 99,998 out now in the Massachusetts registry and it tops all the other combinations in value, giving its chooser four nines, backed up with an eight. There are number plates running up to 101,279 in Massachusetts, which fact offers an almost infinite variety of combinations to make the game interesting.

TEST FOR CHAUFFEURS' EYES.

The New York Medical Journal in a recent number suggests that chauffeurs and drivers of public vehicles should be given tests to determine if their eye sight is good, on lines similar to the tests given by the railroads and that if a man's vision is found to be defective, the writer thinks he should be refused a license. These measures are suggested as a means of preventing many of the traffic accidents that take place in large cities each year, and which it is thought are in some measure due to the defective vision of the operators of motor driven vehicles.



The Tonford Truck Conversion Unit Attached to a Pleasure Car Chassis, Making Its Freight Carrying Capacity 2000 Pounds.

The Tonford Conversion Unit

Description of a Construction For Converting a Pleasure Car Chassis Into a Light Truck

THE sale of attachments for forming light delivery trucks out of pleasure cars chassis has been conducted on such an enormous scale that it virtually is a new and distinct industry. Although the idea is less than three years old, it has been demonstrated as not only practical, but economical, and will to a large extent solve the problem of the disposal of second hand cars, as in case the power plants are still in good working condition, they may be converted into serviceable haulage vehicles and operated at a very low cost.

The Detroit Truck Co., Detroit, Mich., has developed in its Tonford a practical attachment which, in combination with a Ford chassis, makes a light truck with a capacity of one ton, as the name suggests. This unit is a skeleton chassis with a heavy rear axle swung on semi-elliptic springs designed to carry the designated load.

The frame is of channel steel, and fits over the frame of the Ford. It has brackets which support the rear axles of the Ford, and sprockets are attached in place of the rear wheels, the drive being by chain to the heavy truck wheels of the unit, the axle of the pleasure car chassis serving as a jackshaft.

The whole process of attachment is simple and can be accomplished in a few minutes. The assembly is completed with the drilling of four holes for bolts and the attachment of the braking connections, making a conventional one-ton truck construction in the rear, where the weight and strain comes.

The Tonford frame is constructed of two sides, a rear end and two cross members of heavy pressed steel channel section with wide webs. The side members are curved inward at the forward ends and slide onto the frame of the Ford chassis up to the dash and serve to reinforce the latter. The cross members

of the frame are joined to the sides at the spring hanger junctures and serve to reinforce the same. The end member and forward cross member are reinforced with heavy gusset plates, those at the forward member also serving to support and hold in place the end of the Ford frame, which is cambered.

This construction gives the converted truck a double frame from the jackshaft forward and makes for rigidity and strength. The sprockets are keyed onto the rear axle of the Ford chassis and are held with lock nuts. The housing ends are clamped in brackets rigidly bolted to the side members of the unit frame. The drive is through radius rods, which are pivoted to the jackshaft, giving universal action, and are set on rotatable seats at the rear end on the rear axle.

The control of the Ford machine is unchanged, the foot brake operating the brakes, which are retained on the rear axle of the chassis, and the emergency lever being connected up with large internal expanding brake shoes fitted to the rear wheels. Standard type block and roller chains

are used, as in the conventional chain drive type of truck.

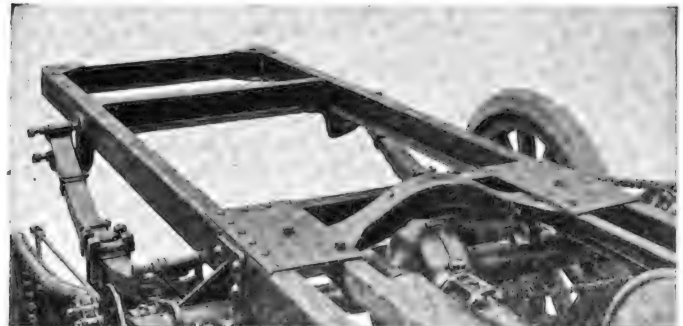
When the unit has been attached to the Ford chassis, the converted vehicle has a wheelbase of 127 inches, which is 27 inches longer than the wheelbase of the standard Ford chassis. The rear tread may be either 56 or 64 inches. The rear wheels of the unit are 12-spoked wooden artillery type with Bower roller bearings, and are fitted with solid tires.

A wide factor of safety is provided by the springs, which are designed to carry a load of 7500 pounds, although the unit is intended to carry 90 per cent. of the total load, or 1800 pounds, of the specified capacity of 2000 pounds. The rear axle, which is 2½ inches square, is a steel drop forging and is guaranteed to carry 3000 pounds under all operating conditions.

In preparing the Ford for conversion into a one-ton truck with the Tonford Unit, the body should be removed first, after which the rear axle is jacked up and the rear spring, wheels and fenders removed. After the brake rods are loosened at both ends and taken out of the supports or guides, the chassis is ready to be telescoped into the frame of the truck unit.

UNITED MOTORS BUYS PATENTS.

The United Motors Co. has bought the patents covering the radiator damper used on Hudson and Columbia cars and owned by the Detroit Motor Appliance Co., which, under the terms of the sale, reserves the right to continue to manufacture a damper for Ford cars.

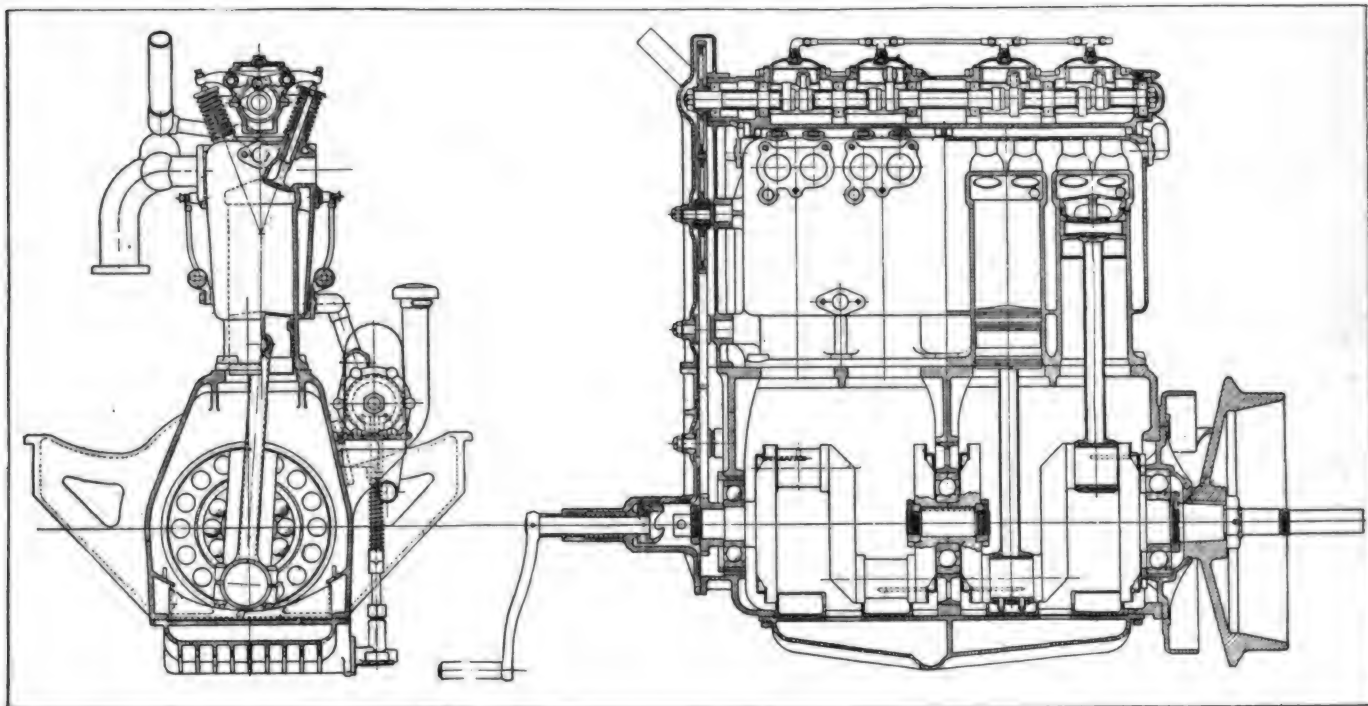


Rear End of a Chassis Converted with a Tonford Unit, Showing the Attachment of the Ford Car Frame.



The Heavy Wheel, Chains, Driving Sprockets, Radius Rods and Spring Suspension of the Tonford Unit.

An American Racing Engine---The Wisconsin Motor.



Part Sectional Views of Wisconsin Engine, Showing Layout of Principal Component Parts.

The Value of Motor Car Racing As Related to Automobile Manufacture—A Discussion Before Society of Automobile Engineers.

By Charles H. John.

(President, Wisconsin Motor Manufacturing Company.)

IT IS my unqualified belief that the phenomenal growth of the automobile industry is directly traceable to racing. Weaknesses of any nature in the construction of a self-propelled vehicle can be ascertained only by actual tests and usually these have to extend over a long period, perhaps a year or more.

Having from previous experiences learned the design and materials to be used, a car is built and entered in a big race, because there it will be tested thoroughly, the various parts being "fatigued" within a few hours to an extent that would not be possible under other conditions in a year's service. The engine particularly, being called upon to do yeoman service, is subjected to enormous strain. If any part of it prove weak or unsuitable, changes are made, to be tested out in the next race.

In the early days of racing, stock cars were used entirely, or slight modifications were made in them, such as stripping them of all unnecessary parts, tuning up the engine and making minor alterations. If more speed was sought, larger engines were employed, and today we still see the enormous power plants of the Blitzen Benz and the F. I. A. T. A limit was, however, soon reached, as it was found that a large engine requires a stronger transmission, stronger axles and heavier construction throughout; as the engine size increased the cars became more cumbersome, harder to handle and really no faster than the smaller ones. Procedure in another direction was therefore necessary to get results. It seemed that if a small and light engine capable of great power could be built success would be assured.

Light Weight Reciprocating Parts.

In the high speed engine the underlying principle is to reduce the weight of the reciprocating parts to the minimum required for safety. Thus are reduced the inertia forces which

cause excessive vibration at high speeds, and waste much power through additional friction. Chromium vanadium steel connecting rods of exceedingly light weight, heat treated, and pistons of special aluminum alloy reduced the inertia forces and relieved greatly the stresses on the connecting rods as well as on the bearings. Alloy steels were employed also for the crankshaft, bolts, gears and other parts subjected to excessive strain. Valve springs had to be made of vanadium steel; and tungsten steel was developed for valves. Bearing metals were given special study, as under the great pressure and at high speeds ordinary metal would burn out in a short time.

Lubrication.

Racing and naturally high speed engines also have compelled engineers to give the question of correct lubrication minute attention. This resulted in the introduction of high-grade engine oil, which has eliminated some engine troubles. It was found that oils subjected to a very high temperature deposit a sediment in the oil chamber. This condition was alleviated by cooling ribs on the pistons and also on the crank case. In a test of one of the large Wisconsin six-cylinder tractor engines we found that running the oil through cool water increased the efficiency nearly 10 per cent. We now are cooling the oil on our tractor engines by means of a jacketed inlet manifold, which at the same time heats the incoming gases.

I attribute a great deal of the success of Wisconsin engines in racing to the forced feed oiling system used. The oil is contained in a separate oil sump and forced by a gear pump through ducts to the main bearings and then through holes bored in the crankshaft to the connecting rod bearings. The oil is forced under pressure from each side of the connecting rod bearings and thrown in all directions. In this way oil is

splashed against the cylinder walls, pistons, push rods and into pockets over the camshaft bearings. Oil is fed also directly over the timing gears by means of a copper tube leading from the main duct. The oil then drains back into the sump through a strainer, and is ready for another journey. This is a most efficient and economical oiling system. In a 10-hour continuous test made recently of a high-speed engine, the consumption of oil was slightly over 0.01 pint per horsepower hour.

Engine Types.

Since the amount of power available from an engine depends upon the volume of gas consumed in a given time, it is evident that by using smaller cylinders and allowing the crankshaft to revolve faster the same amount of power can be obtained as from a larger engine revolving at slower speed. Extensive trials proved that the long stroke engine is capable of greater speed and power than the short stroke engine. This led to the development of the present 300 cubic inch racing engines.

The Wisconsin Motor Manufacturing Company from its inception recognized the benefit which can be derived from racing, and always encouraged the development of this fascinating sport. One of the first engines built was shipped to Harry Stutz of Indianapolis. After giving it a thorough trial he concluded to enter a car propelled by this engine in the 500-mile speedway race. This was purely a stock engine. The results obtained by the Stutz in this race are a matter of record.

It is hardly necessary for me to refer to the success of the Stutz on the speedway, in road races and in transcontinental runs. I wish to say, however, that up to the year 1915 all of the Stutz racers were equipped with practically our stock T head engine. Directly after the Indianapolis speedway race of 1914 we agreed to build for Mr. Stutz four engines that could compete successfully with foreign made engines. Our engineer, A. F. Milbrath, had sketched out some of his ideas, which met with Mr. Stutz's approval, and we immediately started to work on the engines.

Material.

We had heard impressive tales of a new steel made in Belgium, called B. N. D., of wonderful tensile strength, and concluded that we had to get this steel. Orders for crankshaft and connecting rod material were placed at once, but war being declared suddenly we were compelled to look for other sources of supply. We decided to use chromium-vanadium steel of American make, which had given us excellent service. The greatest care was exercised in the selection of all material. Scleroscope and Brinell tests were made, and in addition other physical tests and chemical analyses. After heat treatment, specimens were taken from the various parts and examined microphotographically to make sure the granular structure was correct. With these precautions we were able to demonstrate that America can produce steel equal in strength and stability to anything produced abroad.

Developmental Work.

Our tests convincing us that we had the proper material, we rushed through a single engine in order to give it a thorough test. When it was completed the results were pretty satisfactory, but no extraordinary power or speed was developed. A careful study of lubrication and of ignition particularly was necessary before we could get the desired results. When these problems had been solved satisfactorily we obtained some astonishing results. The engine of 296.81 cubic inches displacement developed 131 b. hp. at 2950 revolutions per minute. After racing trials Mr. Stutz notified us to proceed with the other engines. Three cars were built and their performance has been among the most remarkable in automobile racing. In the 500-mile Decoration Day races at Indianapolis all three finished well up in the running.

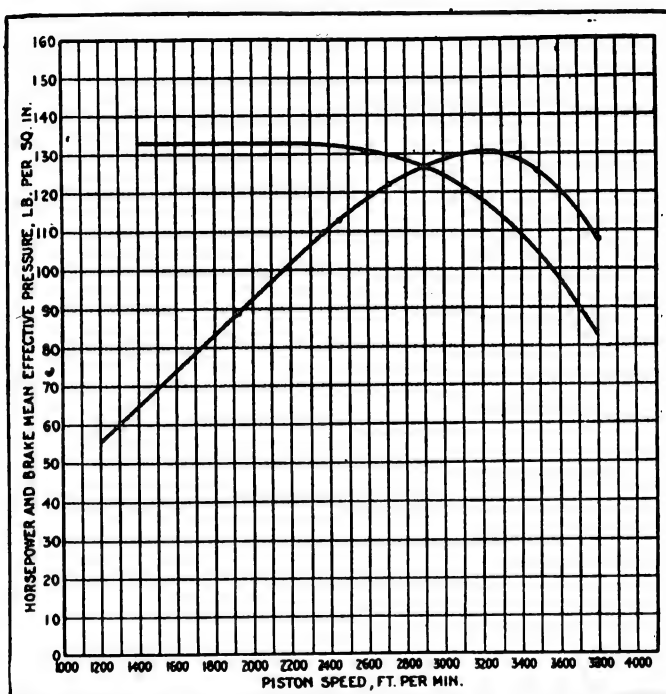
Four-Valve Cylinders.

The valve-in-the-head type of engine has been recognized as the most efficient. It is not necessary for me to argue the merits of the four-valve type of cylinder; neither do I wish to enter into a dispute as to the origin of the type, whether this be English, French or Italian. We find the type used in nearly all of the European racing cars; I will mention the Sunbeam, Humber, Straker-Squire, Vauxhall, Peugeot, De

Lage, Schneider, Mercedes, Isotta-Franschini and F.I.A.T. In all of these there is a certain similarity of combustion chamber, as it is necessary to employ semi-spherical shape to obtain large valve area. It became essential to dispense with valve cages, and we find valves fitted directly in the cylinder head with ample water jackets surrounding them.

Details of Wisconsin Engine.

The aluminum crank case of the Wisconsin racing engine is of the barrel type, with rather a large opening at the bottom, but extremely rigid. The bottom cover is provided with cooling ribs. Ball bearings, with one-inch diameter balls, and held in place by means of cast steel retainers, constitute the main bearings. The engine is three-point suspended, the forward end being supported by a trunnion bearing on the steel front cover plate and the rear carried by a cast steel arm bolted to the crank case. The flywheel weighs 70 pounds. The crankshaft, of chromium-vanadium steel, double heat treated, is $2\frac{1}{4}$ inches in diameter. It is made in two pieces, the two halves being held together by a large bolt. The cylinders are cast in block with ample water jackets around the barrels, as well as around the valves. There are two inlet ports, as well as two exhaust ports, and the valves, which are $1\frac{1}{2}$ inches in diameter, are seated directly in the cylinder



Curves of Brake Mean Effective Pressure and Horsepower for 3 13/16 by 6 1/2-in. Wisconsin Racing Engine.

head. The valve guides are of cast iron and the valves of high tungsten steel. Two valve springs are used, one inside the other; this eliminates the danger of a valve dropping on to a piston should a valve spring break.

A single camshaft is used, operating the valves by means of short fork shaped rockers, one rocker operating two valves. The camshaft is built up and stepped spacers are employed between the cams and bearings, which are of the ball type. The camshaft is driven by means of spur gears $\frac{1}{2}$ inch wide. These also are of chromium-vanadium steel, heat treated; and run on ball bearings. The gears are enclosed in an oil tight aluminum housing. A single gear drives the water pump, oil pump and magneto. The flywheel is of steel.

The connecting rods are tubular, being made from solid forgings of chromium-vanadium steel. A one-inch diameter hole is bored through the entire length, making a very light and at the same time very rigid rod. The big end has four bolts and is bushed with bronze metal lined bearings. The upper end carries a solid bronze bushing with $\frac{3}{8}$ -inch hole for the piston pin. This pin is taper bored, the thicker part being in the centre of the pin, which tapers gradually toward the ends.

The pistons, made of magnallium, weigh 12 ounces each. Only one groove is cut in the piston, this being wide enough to hold four rings 1/16 inch wide. The piston pin is fastened to neither the rod nor the piston, but is free to float, being held in place by means of a wide steel clip liberally perforated with holes. The head of the piston is supported by radial ribs. Two sets of spark plugs are provided, a two-spark magneto being used. The weight of the engine is 600 pounds.

The oiling system is, as mentioned above, of the pressure type. The oil is carried in a sump, drawn through a strainer and forced through oil leads to oil rings carried on the crankshaft. These oil rings carry the oil through holes drilled in the crankshaft to the connecting rod bearings, the overflow from these forming a spray which lubricates the pistons, wrist pins and main ball bearings. Oil troughs also are provided under the rods and the rods are fitted with scoops, so that a double system is employed for the lubrication of the big ends. The excess oil drains back into the sump. A separate oil lead is taken from the pump to lubricate the overhead camshaft, a small stream of oil being directed onto each cam. The ball bearings carrying the camshaft are lubricated by splash from the cams. The excess oil from the camshaft housing returns to the oil sump through the gear housing at the front end of the engine, as well as through a return tube at the rear end.

The engines developed maximum power at about 2950 revolutions per minute, or 3200 feet per minute piston speed.

At this speed the b. hp. was 131. During the races the average engine speed was between 2600 and 2700 revolutions per minute, at which speed the horsepower was 124 to 128. On the test stand the engines were run up to 3500 revolutions per minute, at which speed the horsepower dropped slightly. The maximum pressure on the connecting rod bearings, due to the pressure on pistons, is about 600 pounds per square inch.

The mean velocity of gas through the inlet manifold, at 2950 revolutions per minute, the speed of maximum power, was 175 feet per second, and through the valves 215 feet per second.

The maximum mean effective pressure in the engine, based on the brake horsepower, was 132 pounds per square inch. This pressure was maintained from about 1400 to about 2200 revolutions per minute. At 2950 revolutions per minute it was 118 pounds per square inch.

The timing of the Wisconsin 300 cubic inch racing engine is as follows:

Inlet opens 10 degrees after upper dead centre.
Inlet closes 50 degrees after lower dead centre.
Exhaust opens 50 degrees before centre.
Exhaust closes 10 degrees after centre.

The compression space is figured at 20 per cent. of the total cylinder volume. When turned over by hand the engines show a compression of 95 pounds per square inch. The spark advance at maximum power is about 30 degrees.

EXCLUSIVE FACTORY FOR FORD STARTERS.

The A. B. C. Starter Company, Detroit, Mich., which manufactures a two-unit starting and lighting system for Ford cars, is planning the erection of a new factory which will have a minimum capacity of 300 A. B. C. systems every day.

With a present production of only 75 systems daily and with orders for 40,000 on the books the need of a new and larger plant has become imperative. The new factory, which will be equipped with the most modern machinery and labor saving devices, will be two stories in height and have 25,000 square feet of floor space. The company plans to double this space in the near future by adding two more stories to the structure.

In the installation of the A. B. C. two-unit system, the generator is placed on one side of the motor and the starting motor on the other side, and as they weigh within one pound of each other, the weight is evenly distributed on the chassis. The starting motor is idle when not used for cranking and the generator requires only one-eighth of one horsepower for operation.

No changes in the Ford construction are required in attaching the system, one Ford bolt being removed and replaced by a longer A. B. C. bolt for fitting the motor. A similar operation is required with three bolts on the other side to install the generator. A spring of special alloy construction, placed between the electric motor and gear reduction, takes up the torque or jar when the starting apparatus is put in motion. This permits of the use of a six-volt, 60 ampere-hour battery, which provides much more light than the ordinary battery and costs less for renewals and should last much longer.

A belt with a leather block, which prevents slipping, is used for driving the generator.

A jaw on the armature shaft of the starting motor engages with the regular

Ford starting crank pin, and when the engine starts it is automatically disengaged. A Ward-Leonard regulator is used to positively control the amount of electricity that is delivered to the battery, so that it is impossible to overcharge it. The lights may be allowed to shine with full power or dimmed, being controlled by a switch.

The A. B. C. system, which is given a full guarantee against faulty workmanship or defective material, includes a starting motor, generator, gear case assembly, Ward-Leonard controller, Exide battery and battery box, starting switch, ammeter, lighting switch, dimmer attachments, wiring and all parts necessary for installation.

BAY STATE AUTOMOBILE ASSOCIATION BANQUET.

Members of the Bay State Automobile Association will hold a banquet on Tuesday, March 6, during the week of the Boston Automobile Show. It is planned to also hold an entertainment and invite the presidents of all the automobile organizations in New England.

SCHOLARS USE HUPP FOR DEMONSTRATION.

A specially cut show motor and rear axle, opened to show the operation of the gears and moving parts, has been placed in the lecture room of the Michigan State Auto School by the Hupp Motor Car Co. The installation will be used for demonstration work during the lecture courses.

The motor and rear axle are mounted on steel stands and equipped with levers for hand operation, so that the youth who is studying the mechanics of the automobile can become thoroughly versed in the theoretical side of the work, before taking up the practical shop instruction which is given in a later course.

EASY TO ELIMINATE HEADLIGHT GLARE.

George S. Waite, sales manager of the Grant Motor Car Corp., Cleveland, O., says it is easy to eliminate the glare from automobile headlights if they are hung on brackets and gives the following recipe:

"The solution is to set the lamp so that the upper edge of its beam, which if the lamp is a good one is clearly defined, will be parallel to the ground. When the lamp is set square, the centre line of the beam is parallel to the ground, but the distance between the edges of the beam grows greater as the distance from the lamp grows greater.

"It is, however, easy to understand that if the upper edge of the shaft of light is parallel to the ground, the light will extend for as great a distance as the lamp is capable of throwing it, but will be sufficiently low so that it will not strike the eyes of a person approaching, whether afoot or in a vehicle."

MANY WOMEN DRIVERS IN SOUTHERN CALIFORNIA.

Of the 79,000 automobiles that are registered in Southern California, it is estimated that over 16,000 are driven by women. The dealers in the territory claim that the excellent facilities and conditions for touring in that section are responsible for the large number of women motorists. The roads are excellent and are well posted with over 12,000 sign boards.

SALES AT LOWELL, MASS., SHOW OVER \$80,000.

Over \$80,000 worth of cars were sold during the week of the first annual automobile show of the dealers in Lowell, Mass., which was held in the Casino in that city from Jan. 23-27.



The Firestone Tire and Rubber Co.'s New Branch in Los Angeles, Cal.

The Business Side of the Motor Industry

The Packard Motor Car Co. is planning the erection of a new sales and service building in Detroit, which will contain a huge auditorium with a seating capacity of 2500 persons. The building, which will be eight stories in height, will be erected on a 236x200 foot lot, located close to the junction of two of the city's principal arteries of travel.

The directors of the Packard company in planning the auditorium were influenced by the fact that Detroit, despite the important position it now occupies among the great centres of the United States, has no adequate building for the presentation of high class musical productions, grand opera and other entertainments. As the company has developed into one of the foremost industries of the city, it was deemed reasonable that it should demonstrate its loyalty to the citizens by contributing to their entertainment and pleasure. The work on the new building will start in June.

The Selden Truck Co. has broken ground at Rochester, N. Y., for a new addition to its plant. The building will provide 14,000 square feet of additional floor space for manufacturing facilities and will extend west from the present plant, parallel with the tracks of the Rochester and Eastern Electric Railway on one side and the New York Central on the other.

The Firestone Tire and Rubber Co. has opened its new branch at Los Angeles, Cal. The occasion was attended by a celebration in which the business houses and city officials participated. The exercises were attended by over 500 Firestone dealers from all parts of Southern California, Arizona and Nevada. Street decorations and special window displays in many stores proclaimed the opening as Firestone Day and the visiting dealers, officials and others present rode in

automobiles, which paraded through the main thoroughfares.

The Allen Motor Co., Fostoria, O., is planning the establishment of an automobile community, to be known as the "Allendale Addition," which will be located on the outskirts of the city and will include a modern automobile plant, ideal homes for working men, modern streets, sidewalks and other improvements to make it a model community where "automobiles of supreme quality can be turned out by satisfied workmen," as the objects of the enterprise are described by W. O. Allen, the general manager of the company.

A site of 150 acres has been selected. It is traversed by three railroads, the Big Four, Toledo & Ohio Central and the Hocking Valley. A large centralized plant will be erected and lots will be set aside for the erection of homes for the employees. The property is now being surveyed preparatory to laying out the

building sites, streets, etc.

F. F. Deall, vice president of manufacturing of the Packard Motor Car Co., Detroit, Mich., has announced the appointment of E. F. Roberts as factory manager and that of C. F. Tollzien as manager of production. These two positions were created to increase the efficiency of the general organization, Mr. Roberts having been promoted from general superintendent and Mr. Tollzien from the position of purchasing agent.

The Hyatt Roller Bearing Co., Chicago, Ill., has created a special department, which will handle the sales and application of Hyatt bearings to farm machinery. This department will be in charge of F. N. G. Kranich, who recently joined the company's engineering staff.

The Bosch Magneto Co., New York, have recently signed contracts with the following to use Bosch magnetos during the current year: Nelson & Le Moon, Chicago; Maccar Truck Co., Scranton, Penn.; F.

I. A. T., Poughkeepsie, N. Y.; Old Reliable Motor Truck Co., Chicago; Indiana Motor Truck Co., Marion, Ind.; Lange Motor Truck Co., Pittsburg; Zettler & Lamson Truck Co., Chicago; Federal Motor Truck Co., Detroit; Brennan Motor Mfg. Co., Syracuse, N. Y.; Watson Wagon Co., Canastota, N. Y.; Continental Truck Mfg. Co., Superior, Wis.; Brockway Motor Truck Co., Cortland, N. Y.; Eastern Motors, Inc., Hartford, Conn.; Kent Motors Corp., New York; Brinton Motor Truck Co., Philadelphia.

The Edward V. Hartford, Inc., Jersey City, N. J., manufacturer of the Hartford shock absorber, Hartford auto jack and Hartford bump absorber, has issued an elaborate portfolio, setting forth the details and plans of the extensive advertising campaign that will be conducted during 1917 to assist dealers in marketing Hartford products.



F. N. G. Kranich, Department Manager of Hyatt Roller Bearing Co.



W. O. Allen, General Manager of the Allen Motor Co.



Elgin Six Dealers from All Parts of the Country Who Were Banqueted by the Elgin Motor Car Corp. in the Gold Room of Kaiserhof Hotel During the Chicago Show.

The company's publicity will appear in over 20 of the leading magazines and in 13 of the leading newspapers in all the large cities of the country. Over 30,000,000 readers will be reached by the campaign. In addition to this campaign to back up the dealers and bring them business, attractive folders will be furnished all the dealers with their names printed on them, describing the various Hartford products. The Hartford guarantee goes with all the Hartford products, which provides that any article of their manufacture not proving satisfactory after 30 days trial from the date of purchase can be returned and the purchase price will be refunded.

The Racine Rubber Co. in 1916 made net profits of \$720,189, as compared with \$540,497 in 1915 and \$573,352 in 1914. It has a surplus of \$894,198.

The Kerosene Carburetor Co., Frankfort, Ind., which is planning the erection of a new factory for the manufacture of kerosene carburetors, has received an order for 3000 instruments from the Ford Motor Co. The Indiana Brass Co. of Frankfort is at present producing the carburetors.

The Pennay Motors Corp., Pittsburg, Penn., which was formerly the Kosmath Co., has stopped production of its commercial model and will hereafter make only pleasure cars.

The H. H. Franklia Mfg. Co., Syracuse, N. Y., has doubled its production as compared with this time last year and is now turning out 30 cars a day.

G. F. Discher, president and general manager of the Gemco Mfg. Co., Milwaukee, Wis., has been granted a preliminary injunction against the Shadbolt & Boyd Iron Co., restraining the latter concern from selling the auto bumper made by Emil Grossman Mfg. Co. The injunction was asked on the ground of patent infringement and covers the eastern district of Wisconsin. It is understood that the defendant will take an appeal from the decision.

The Lee Rubber and Tire Corp., Conshohocken, Penn., has passed a dividend on its stock. The directors in explaining their action state that the company has recently made large expenditures for enlarging the plant to nearly double its capacity and this fact, coupled with decreased earnings resulting from the high cost of materials and decreased production, made it necessary to conserve the surplus.

The Kissel Motor Car Co., Hartford, Wis., have added a new car to their line, which is larger than the Hundred Point Six model and is equipped with a Weldely

12-cylinder motor with overhead valves. The new car was shown at the company's sales rooms during the week of the Chicago show, but it will not be placed on the market until it has been thoroughly tested out.

H. L. McClaren has been elected president of the Racine Rubber Co., which was recently acquired by the Ajax Rubber Co. of Trenton, N. J. Mr. McClaren was formerly head of the Racine company when it was owned by the Mitchell Lewis Motor Co., of which he was president. He succeeds Stuart Webster, who will continue as treasurer and director of the company.

The Bartholomew Co., Peoria, Ill., manufacturers of the Glide car, have announced an increase in price of \$125 on their product, making the new price \$1250.

The Braender Rubber and Tire Co., Rutherford, N. J., has advanced the prices of all its tires and tubes from 10 to 20 per cent. In the Rocky Mountain states an additional advance of five per cent. on the new prices has become effective.

The Olds Motor Works, Lansing, Mich., has appointed P. L. Emerson as general sales manager to succeed Jay Hall, who resigned last summer. G. L. East is assistant sales manager.

The Belmont Motor Car Co., Toledo, O., has appointed A. J. Wilson as advertising and sales manager.

The Chalmers Motor Co. held a meeting in New York City and the following officers and directors were elected: Hugh Chalmers, president; E. C. Morse, vice president; W. P. Kiser, secretary; D. P. Turnbull, treasurer. These officers and C. A. Woodruff, C. A. Pfeffer, C. C. Hinkley and B. Lockwood constitute the directorate.

The Flske Rubber Co., Chicopee Falls, Mass., will enlarge its plant by the addition of a mill building six stories in height and 60x105 feet. Over 25 acres of floor space is at present occupied in the company's operations.

F. J. Campbell, president of the Campbell-Ewald Co., advertising agents of New York City, has resigned and disposed of his interests in the company, although he will continue to serve the organization for a time in an advisory capacity.

H. T. Ewald has been elected president of the Campbell-Ewald company to succeed Mr. Campbell and C. A. Sloan was elected vice president. G. C. Brown is secretary-treasurer of the company.

The Campbell-Ewald Co., has recently taken over a number of large advertising accounts, including those of the Perlman Rlm Corp., Dayton Engineering Labora-

tories Co., Advance-Rumley Co., Van Blerck Motor Co., Bearings Service Co. and United Motor Service.

The Pallau Steel Springs Co., Mt. Clemens, Mich., held its annual meeting and the following officers and directors were elected: J. N. O'Brecht, president; A. T. Donaldson, vice president; P. J. Ulrich, secretary; A. Marlette, treasurer. Directors, A. T. Donaldson, J. N. O'Brecht, L. O'Brecht, R. A. Waterbury, P. J. Ulrich, W. Kruse, F. E. Nellis, Andrew Healey and A. Featherstone.

The Harroun Motor Co., Detroit, Mich., has accepted the provisions imposed by the Michigan Securities Commission, under which it may sell \$1,000,000 treasury stock of the company in that state. These provisions require that the original promoters of the company place \$4,000,000 worth of their stock in escrow with the commission, which stock is to be held until the company is able to pay six per cent. on the entire \$10,000,000 of capitalization. The company must not pay over 10 per cent. commission for selling the stock and must submit all advertisements regarding the sale to the commission.

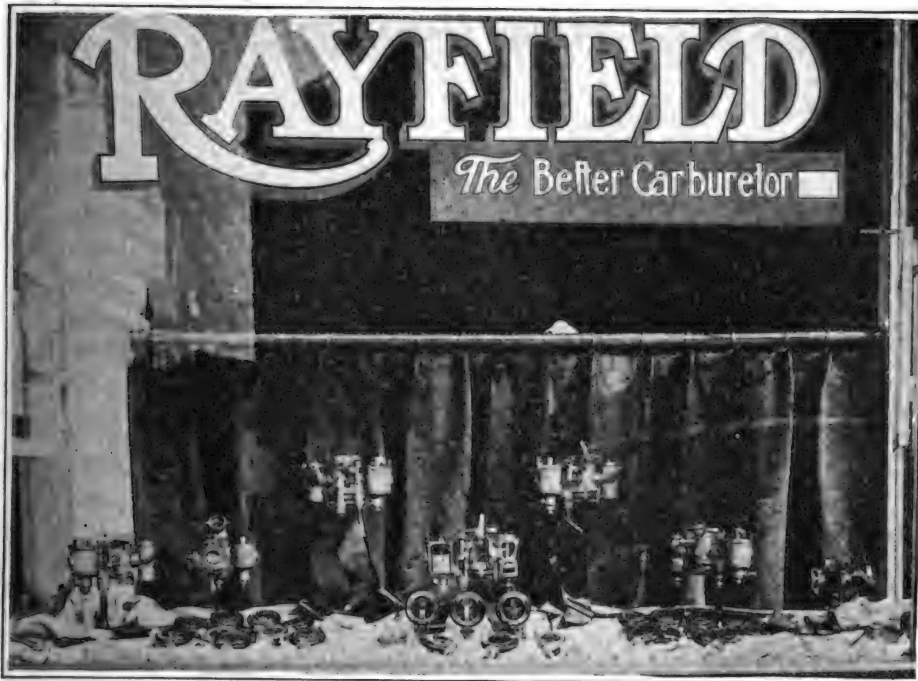
The Nippon Sharyo Kaisha, Tokio, Japan, has been formed in that country to manufacture an automobile of 10 horsepower designed along lines suitable for use under the conditions peculiar to that country. The machines will have a tread of about the same width as the jinrikishas and will use a low grade petroleum. The selling price will be approximately \$500.

R. H. Scott, vice president and general manager of the Reo Motor Car Co., Lansing, Mich., has announced that the company will probably raise the price of the Reo car in the near future. This action will be made necessary, he states, by the fact that the company will have to renew its material contracts at much higher prices than those stipulated in the ones now expiring, which were made two years ago when materials were much lower.

The Stephens Motor Branch of the Moline Plow Co. has appointed B. F. Durham as assistant manager of the automobile sales department. Mr. Durham was formerly with the Maxwell Motor Co. Hugh C. Dunning and Fred Corbelle have also joined the Stephens organization. They were formerly with the Chevrolet company.

H. L. Innes has been appointed factory manager of the Chevrolet Motor Co., Flint, Mich. He was formerly with the Dodge Brothers.

L. W. Enos has been appointed assistant sales manager of the Steel Products Co., Cleveland, O. He will handle the



How the Makers of Rayfield Carburetors, Flindelsen & Kropf Mfg. Co., Displayed Their Instruments Recently to Persons Passing Company's Broadway Sales Room.

Michigan territory. Mr. Enos was formerly with the Willard Storage Battery Co.

H. R. Williams, formerly with the Chanslor and Lyons Co., Seattle, Wash., has been appointed sales engineer and manager in charge of the factory equipment business of the Klaxon Co. at the Detroit office.

The U. S. Light and Heat Corp., Niagara Falls, N. Y., has appointed John A. White as general sales manager of the company, with headquarters at the plant. Mr. White, who has been with the company for the past eight years, up to the time of his promotion was manager of the company's Chicago office.

The Rainier Motor Corp., Flushing, L. I., has moved into its new plant and the main offices and headquarters have been moved from New York City, where they were maintained in the sales rooms.

The Hancock Mfg. Co., Charlotte, Mich., will distribute \$8000 among its employees

as bonuses. There are 42 entitled to the share in the distribution and they will receive from \$100 to \$400 each.

The Western Carburetor Corp., Alma, Mich., has filed articles of incorporation at Lansing, Mich. The capital is \$100,000.

The Erickson Wheel Corp. has been incorporated under the laws of Delaware with a capital of \$5,000,000. A. B. Wilson, Weehawken, N. J.; J. W. Mitchell and C. W. Gould of New York are the incorporators.

C. R. Collins, formerly advertising manager of the Stromberg Carburetor Co. of America, has been appointed advertising manager of the Racine Rubber Co., Racine, Wis.

Ralph Muford, the well known racing driver, who piloted Hudson cars during the past season on the speedways and in hill contests, has resigned from the Hudson Motor Car Co. of Detroit, Mich. He has made no announcement about new connections, although it is understood

that he is about to join one of the automobile manufacturing companies in Cleveland.

H. A. C. Fay, New England district manager of the Service Recorder Co., Cleveland, O., has been appointed general manager of the Frank G. Robins, Inc., Hartford, Conn., distributors for Saxon cars, the Autocar and Avery plows. Mr. Fay will retain his connection with the Recorder company and will have his headquarters at Hartford.

The Dayton Motor Truck Co., Dayton, O., has been organized by J. M. Dunwoodie, Barry S. Murphy and other business men of that city for the purpose of taking over the plant of the Durable Dayton Truck Co. and resume the manufacture of trucks of from two to seven and a half tons capacity, both worm and chain driven types.

A three years' contract has been closed with the exporting firm of Melchor, Armstrong & Dessau Co. to handle the company's trucks in foreign countries. An order has already been placed for a large number of the trucks for shipment to Russia, Cuba, Porto Rico, Australia and the Far East.

The Four Wheel Drive Auto Co., Clintonville, Wis., has declared a cash dividend of 15 per cent. in addition to a stock dividend of 100 per cent., making a total of 130 per cent. The stockholders have received since last July, a cash dividend of 15 per cent. having been declared at that time. The announcement of the extra stock dividend was made at the annual meeting of the stockholders, at which nearly 90 per cent. of the shares were voted. All the officers and directors of the company were unanimously re-elected.

C. C. Barley, president of the Indiana Truck Corp., who was the principal speaker at a banquet which was attended by the company's officials and dealers, stated that it was possible to quadruple the earning power of heavy duty trucks through speeding up in loading and discharging.

The Smith Motor Truck Corp., Chicago, Ill., makers of Smith Form-a-Trucks, have broken ground for a second large plant. Work will be rushed in order to have the plant ready for occupancy by May 1. It will be similar to the one erected last year and will have a capacity of 300 attachments per day. E. I. Rosenfeld, vice president and general manager of the company, says that the production schedule for the current year, which was estimated at 30,000, will be exceeded by 20,000, bringing the total to nearly 50,000.



Gathering of Chalmers Dealers and Factory Men in Congress Hotel, Chicago, Where They Ceased Show Business Long Enough to Indulge in a Sumptuous Banquet.

Makers Offer Plants for War

Several Car, Material, Parts and Tire Companies Volunteer Services If Need Arises

The action of many of the automobile companies and parts manufacturers in offering their plants to the government in case of war recalls the speech made by Howard E. Coffin at the annual dinner of the S. A. E. during the week of the National Automobile Show in New York.

In discussing "Preparedness" on that occasion, Mr. Coffin, who recently had completed an industrial inventory for the government, stated that the automobile manufacturers would be surprised if they found out what they would have to make if war were ever declared against the United States. "Out of 100 first class automobile manufacturers," he said, "only 25 would confine themselves to making automobiles in case of war." He added that the other 25 would turn out products to which "they now are utter strangers."

Henry Ford was one of the first manufacturers to offer the government the use of an automobile plant in case of war. His action was quickly followed by a similar offer made by President Samuel P. Colt of the United States Rubber Company, also by the Du Pont Company, the American & British Mfg. Co. and many concerns engaged in the manufacture of steel and iron products and of tires.

Mr. Ford in making his offer to Secretary Daniels said: "I stand with our president, and in the event of a declaration of war will place our factory at the disposal of the United States government and will operate without one cent of profit. I will also contribute my own time and work harder than ever before."

SAXON PLANT AT DETROIT DESTROYED BY FIRE.

The plant of the Saxon Motor Car Corp., Detroit, Mich., was practically destroyed by fire on Feb. 3. The loss is estimated at \$250,000. As a result of the fire over 1200 men have been thrown out of work. The temperature was two below zero when the fire broke out and the firemen found the work of subduing the flames very difficult. The Saxon company has already arranged to continue operations in another plant without appreciable interruption to operations.

FISK BECOMES FOUNDER OF LINCOLN HIGHWAY.

The Fisk Rubber Co., Chicopee Falls, Mass., has pledged a sum of money to be paid annually for the next three years toward the work of the Lincoln Highway Association and thereby becomes one of the founders of the organization.

The Fisk company last summer contributed the tires that were used on the painting caravan which crossed the country on the highway repainting and renovating the markers and road signs.

Through their recent pledge, however, of over \$1000 to the maintenance of the association, the company becomes a member of the organization in the class with the founders, which include all individuals and firms that have contributed that sum or more.

PIKES PEAK HIGHWAY ASSOCIATION MEETING.

The Pikes Peak Highway Association has issued a notice of the organization's fourth annual meeting, which will be held at St. Joseph, Mo., in the Commerce Club quarters on Feb. 13-14. The annual election will take place at the meeting and various subjects will be discussed for the betterment and improvement of the route.

NEW BEDFORD AUTOMOBILE SHOW A SUCCESS.

The automobile show at New Bedford, Mass., held during the last week of January, was attended by more than 10,000 during the five days the show was open, and dealers reported bona fide sales of 100 cars. Stephen D. Pierce managed the show.

STATE PRISONERS MAKE AUTO BODIES.

Prisoners in the state prison in Maine have been set at work on a contract for 200 automobile bodies. In the past prison inmates have been taught the carriage making trade, but there has been so little demand of late for this product that the warden decided to turn the carriage making crew into motor car body builders.

JOHN LIGHTFOOT, INDIAN, DRIVES A CAR.

John Lightfoot, a reservation Indian in the southern part of Arizona, has purchased an automobile, and thereby established a precedent, as he is the first of his race, which has stuck to farming, to use a motor car. Other Indians in that section have taken up driving as an occupation, but the honor of being the first car owner among the reservation, or "blanket" Indians, falls to John Lightfoot.

RAILROAD SUES MOTORIST.

The Minneapolis and St. Louis railroad has instituted a suit against a farmer of Marshalltown, Ia., and asks damages to the amount of \$4000, which it is claimed the defendant inflicted upon the road's property when he ran his automobile into one of the trains with the result

that two cars were derailed and one of the employees killed. The administrator of the employee's estate has also commenced action against the farmer for \$5000 in behalf of the victim's widow.

STEAM SNOW PLOW ON LINCOLN HIGHWAY.

In order to keep the section of the Lincoln Highway open that passes through Newark, N. J., James L. Reilly, consul of the Lincoln Highway Association, and secretary of the Newark Board of Trade, introduced a resolution before the Essex-Hudson Joint Freeholders Committee to provide a steam snow plow for local use. This section of the highway is used by hundreds of motorists daily and every effort is being made to keep it open during winter.

ELGIN SIX WINS PERFECT SCORE.

An Elgin Six, made by the Elgin Motor Car Co., Chicago, won every racing contest in which it was entered during the past season. The makers are particularly proud of its performance, as in most of the contests the competing cars ranged in price from \$1200 to \$5000, while the Elgin sells for less than \$1000. Additional credit also accrues to the victories, as they were won in contests covering almost every type and class of motor car performance, including speed, endurance and economy.

The most important events won were: The Chicago Master Driver Contest, the West Michigan Pike Tour, the Minneapolis, Minn., Fargo, N. D., endurance race, the record breaking run from Chicago to Miami, Fla., and return and the annual Chicago Motor Club run from Chicago to Bass Lake, Ind., and return. All three Elgin entries in the last run traveled the 210 miles, averaging 25.6 miles to the gallon of gasoline.

DOG DRIVES CAR IN NEW YORK CITY.

The first canine chauffeur to appear in public recently made its debut on Fifth avenue, in New York City. This precocious dog is named Rex and he drives a Scripps-Booth roadster belonging to his master, Irving K. Weed, of Poughkeepsie, N. Y. Wearing a regulation chauffeur's hat and goggles, Rex made a big hit as he piloted the car down the avenue with as much skill as the average driver.

ROUTE FROM PORTLAND TO WHITE MOUNTAINS.

If the present plans included in the new programme for improved roads in Maine is carried out a new route will be laid between Portland and the White Mountains in New Hampshire, to be called the Ossipee Trail. It will follow an old Indian trail from Lake Ossipee to the coast, which has been used but little for automobile traffic owing to the poor conditions of the road bed. The

existing route into the White Mountains from Portland runs into the Crawford Notch territory, passing on the east side of Sebago lake and through Raymond, Naples, Bridgton, Fryeburg and Conway.

NEW SERIES FOUR OF THE MADISON SIX.

C. E. Gibson, president of the Madison Motors Corp., announced the new series four of the Madison Six at the Chicago Show, which will include the new Dolly Madison four-passenger roadster in place of the two-passenger roadster, which has been discontinued.

Both the five and seven-passenger models are continued, but are presented with new lines, many refinements and additional equipment. A greater variety of color finishes, which are optional, are also offered in the new models.

HETTY GREEN ON AUTOS.

The many idiosyncracies of the late Hetty Green are well known, although it was not until after her death that the fact of her aversion to automobiles was made public. She is accredited with having said to a neighbor that she would rather have a donkey than an automobile.

"Autos, like tips," she said, "are extravagant things. They chug-chug along wasting money, destroying nerves, breaking down and smashing property. It's a wonder there are not more law suits for damages. Autos kick more than mules. I never heard of an auto without learning that it had broken down. Then there are the extra expenses of a man to run the vehicles and repairs. I guess it is cheaper to ride the way I do."

Preliminary estimates of the total sales made at the Chicago show place the sum at approximately \$3,500,000. I. J. Ollier, Studebaker's director of sales, said it was the greatest selling show in history of the industry.

Hard to Enforce Light Law

Boston Police Commissioner Declares It Difficult to Prosecute Offenders Against Light Statutes

Police Commissioner Stephen O'Meara of Boston, Mass., in his annual report states that prosecutions by the police for the violations of the "dazzling headlight" law are almost impracticable owing to the vague wording of the law.

His report shows that 65 complaints were drawn under the law in 1915 and in only 13 cases were fines imposed. During the year 4440 persons were prosecuted for violations of the auto laws, of which number 29 were sent to prison, 33 placed on probation, 2891 fined and 146 found not guilty. The remaining 1554 cases were placed on file.

The report shows that 48 persons were killed and 981 injured during the year in auto accidents as compared with 45 killed and 852 maimed in 1915. The majority of accidents occurred in the Back Bay district, while in 1915 the most accidents happened in Roxbury and Dorchester.

Of the 333 automobiles stolen in Boston during the year the police recovered 132 and arrested 81 alleged auto thieves.

RAPID FIRE METHOD OF BUILDING BRISCOES.

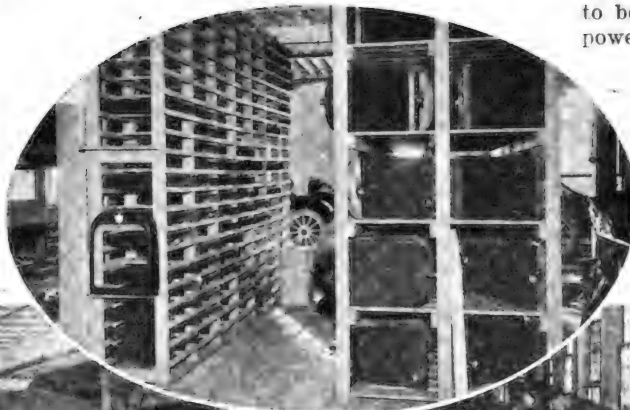
Manufacturing methods used by the American builders of motor cars are the admiration of the industrial world. As

a whole the makers in the United States have developed their plants and equipment to the ultimate in efficiency. On this page is shown a group of pictures that well illustrate the assembly track method, by which it is possible for car builders to turn out their cars by the hundreds daily.

The views were taken in the plant of the Briscoe Motor Corp., Jackson, Mich. The view at the right shows how the car frames, after axles, springs and wheels have been added to it, travel down the assembly track, which is 500 feet long. Parallel to this track are stock racks, stock rooms and stock bins, in which are parts and various sub-assemblies stored in sequence as they will be incorporated in the chassis. The oval view shows the arrangement of the stock bins, etc.

Simultaneously work on the bodies progresses on the floor immediately above the final assembly track and a finished body is lowered at the exact moment when needed through a hole in the floor as a chassis passes beneath. The car never stops its pace and as soon as the body is in place fenders, spare tire carrier, steering post, lamp brackets and lamps and radiator hood are mounted. Water, oil and fuel is also placed in the car as it nears the end of its journey on the track. The view at the left shows Briscoe cars complete and ready to be run off the floor under their own power to the testing yard.

The Kelly-Springfield Tire Co. reports gross profits for the year 1916 of \$3,464,458, and net income of \$2,117,313, as compared with \$2,880,080 and \$1,706,743 respectively in 1915.



Three Steps in Building Briscoe Cars by the Assembly Track Method.



NEW DEPARTURE BALL BEARINGS

American Made
FOR
American Trade
QUALITY
FIRST

THE NEW DEPARTURE
MANUFACTURING CO.
CONRAD PATENTS LICENSEE
BRISTOL, CONN., U.S.A.

TRADE MARK

NEEDHAM

RFC U. S. PATENT OFFICE

Highest Quality in Design—Workmanship—Material
Not Theory But Proven Facts

You Have Tried the Rest
Now Get the Best

NEEDHAM TIRE COMPANY
Charles River, Massachusetts



BRISCOE \$685

The Car With The
Half Million Dollar Motor Fully Equipped

BRISCOE MOTOR CORPORATION
Sept. 26. Jackson, Michigan.

Touring Car \$685
Coach-like \$810
Four-Passenger Roadster \$685
Delivery Car \$710

Regal-4-thirty-two

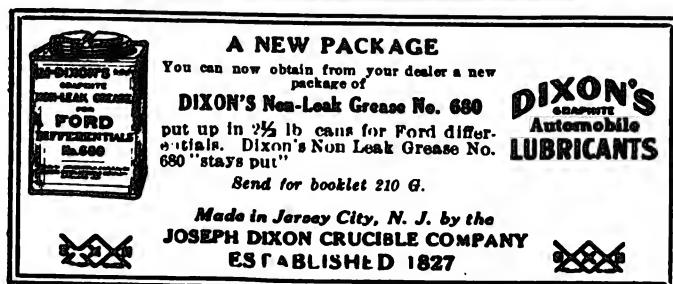
THE BIGGEST CAR IN THE LIGHTWEIGHT CLASS
\$745.00
REGAL MOTOR CAR CO. - - DETROIT, MICHIGAN

OLD SOL
NITROJECTOR No 100

THE 100% PERFECT SPOTLIGHT

Hawthorne Mfg. Co., Inc., Bridgeport, Conn., U.S.A.

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A NEW PACKAGE

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LUBRICANTS

QUERIES

NOTICE TO READERS.

THIS department contains the Mechanical Editor's answers to readers' inquiries. It is open to every subscriber. If any part of your car is not operating satisfactorily, or if you desire information regarding operating, maintaining or repairing motor cars, do not hesitate to lay your troubles before him. He will answer promptly and fully, either by mail or in these columns, as you direct. This service is free to every subscriber, and is often the means of saving considerable money that otherwise would be spent with a garage man. Letters should always be signed with the writer's full name and address, and the car or part in question should be properly identified, by mentioning the maker's name, model, year of production or other distinguishing feature. Address all inquiries to the Mechanical Editor.

REMODELING A FORD CAR FOR RACING. (A. B. D., Arctic, R. I.)

How can I remodel a Ford car for racing? Shall I change the camshaft? What is the best way to drop the engine or frame so that the car will hold the road better?

The question of weight is the first one to be considered. All unnecessary parts, such as windshields, tops, fenders, etc., should be removed. Wire wheels may be substituted for all-wood wheels. Do not, however, under any circumstances, sacrifice strength for lightness.

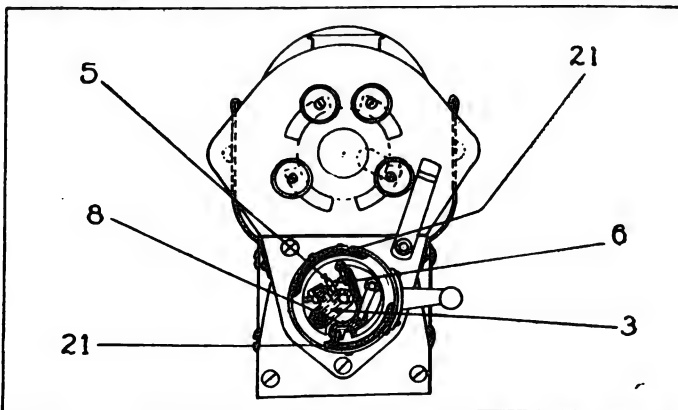
You may mount the chassis on the axles, using cantilever springs, which will enable you to drop the frame a number of inches. It is not advisable to alter the engine mounting.

The gear ratio in the rear axle may be changed. Gears for changing the Ford rear axle to different speed ratios are being made by a number of concerns and can be obtained from good supply houses.

It will not be advisable for you to change the design of the engine in any way. We advise you to use the regular stock camshaft in the engine. Aluminum pistons and special leak tight piston rings may be substituted at an advantage.

HIS CAR IS HARD TO START. (W. W., Overbrook, Penn.)

What makes my 1913 car so hard to start? I keep it in a heated garage. At times the spark is good, and at others only just a faint one. The starter does not turn it over fast enough. Can I fix it so that it will turn it over faster?



Bosch Breaker Box: 3, Insulator Terminal; 5 and 6, Breaker Points; 8, Breaker Arm; 21, Fiber Cams.

(When Writing to Advertisers, Please Mention The Automobile Journal.)

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Pierce-Arrow	Cadillac	Howard	Norton Trucks
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Chalmers	Knights	Daniels	Crane-Simplex
Overhead	Saxon	G. M. Co.	Singer
Chandler	Stutz	Gramm-Bernstein	Stevens
Haynes	National	Trucks	United Truck
Chevrolet	Vellie	Kissel	Willcox Truck
Dort	Jackson	Far	Jordan
Cole	Apperson	Republie Trucks	Liberty
Reo	Davis	Murray	Signal Truck
Peoria	Detrolter	Hour-Davis	Sandow Truck
Peoria	Peterson	Premier	Scripps-Hoath
Dodge	McFarlan	Knox	Gabriel Truck
Brothers	Westcott	McLaughlin	Jathander
		(Canada)	Sterling Truck
		Diamond T Truck	Abbott

Have You This Plug On Your Car?

From what you say regarding the faintness of the spark we should judge that your trouble is in the magneto, although the trouble may be located in the wiring, or gasoline and gas supply.

Before inspecting the magneto for trouble, however, you had better go over the whole ignition wiring for short circuits, paying particular attention to those portions of the wiring which go through metal parts or are near metal. Examine the wire for broken insulation. See that all the connections and screws are fitting tightly.

We give herewith a sketch of the Bosch magneto breaker box and the proper adjustment of the breaker points. As the engine turns over you will note that the cam No. three and the rocker arm No. 8 revolve with the armature. As the arm reaches the circuit breaker fiber No. 21, it rises and rides upon it, thereby causing the platinum points at No. 5 and No. 6 to separate. This separation, according to the Bosch manual, should not exceed .4 mm. or .157 inch. Adjust this gap by unlocking the set nut on the cam No. 3 and screwing up on the adjusting screw, relocking the set nut as correct adjustment is obtained. A piece of sheet steel of the required thickness to be used as a gauge for this adjustment may be obtained from a hardware dealer.

Now turn the engine over until the arm No. 8 slips off the fiber No. 21 and inspect to make certain that the two contact points, No. 5 and No. 6, come together. Inspect these points. They should present a smooth surface to each other, as a good connection at this point is vital. If they are worn or pitted new ones should be obtained from the factory.

Take out all the plugs and place them, properly connected with the secondary wires, on their sides on top of the engine. You will find it no trouble to spin the engine. Turn the engine over at normal speed, that is, at about the speed of the self-starter. Note whether all plugs spark properly. If they are all right replace, as your magneto is all right. If not, the magneto is still at fault. It should be sent to the maker for adjustment.

Should the magneto be all right and the engine still be at fault, that is start very hard when engine is cold, try priming

it by inserting gasoline into the cylinders, about a teaspoonful to each cylinder. Note what effect this has upon starting. We have given an answer to a letter in our Jan. 25th issue which will come handy in regard to priming. If upon priming you find the engine easily started your trouble will be found in one of the following reasons:

Leak in gasket between intake manifold and engine: Remove manifold and replace gaskets with new ones, well covered by graphite and oil. Manifold joints should be well cleaned before putting together. An air tight joint is a vital necessity to easy starting.

Leak in gasket between valve caps and engine: Gaskets at this point should be replaced as above. The same holds true with these gaskets as does with the manifold gaskets.

Leak in priming cocks or spark plugs: Faulty threads on either of these will cause leakage. If leak is not stopped by screwing up tighter, try graphite and oil. Do not use shellac on the spark plugs.

A leak in the gasket between the carburetor and the intake manifold will cause difficulty in starting. Gaskets at this point may be made of shellacked paper or thin cardboard.

Carburetor trouble will cause difficulty in starting. A flooded carburetor will cause too rich a mixture and attending trouble. The float level of the gasoline in the float chamber should be about $\frac{1}{8}$ inch below the spray nozzle. The needle valve should not be opened too far. Too lean a mixture caused by shutting off the needle valve and a consequent lack of fuel will prevent the engine starting at low speeds of the crank.


Examine the carburetor well; see that all the parts are clean. The little passages between the float chamber and the needle valve frequently get clogged up by sediment or lint. A drop of water at this point will prevent the proper flow of gasoline.

The supply pipe from the tank to the carburetor may have an obstruction. An end of packing from one of the joints may work into it in such a manner as to form a valve and stop the flow.

In your letter you did not complain of poor compression.

HEINZE


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HEINZE ELECTRIC COMPANY

Should this be the case, however, you will find that by remedying it you will help the starting trouble. Poor compression may be caused from leaky valves or piston rings; poorly fitting pistons or scored cylinders. There are many so called leak proof piston rings on the market of different designs. Valves should be properly ground in. The bushings or valve guides often times wear to such an extent as to let air through at these points. New guides or valves will remedy this evil.

HIS BRAKE ROD BECOMES STUCK.

(J. M., Marlboro, N. J.)

The brake on my Chevrolet 4-90 sticks to the drum. How can I remedy it?

Your trouble is probably in the rod which passes through the differential housing and may stick in the bearing points. This is the rod which contracts the brake band. See that it works free at all points.

CHARGING U. S. L. BATTERIES.

(H. D. N., Lyon Station, Penn.)

I have an 18 volt 9 cell U. S. L. battery. Will you please tell me how many lights to use in circuit of 110 volts to charge it? What size wire shall I use? Can I use No. 14 wire? Must it be single or a number of wires? What is the purpose of the small wire near the positive terminal on the storage battery?

About how much current will it take to charge battery, and what will it cost at 10 cents a kilowatt?

Will Mazda bulbs answer the same purpose as carbon bulbs?

We give the following data, which applies to an 18 volt 9 cell 250 ampere-hour U. S. L. battery, and does not apply to any other battery of a different voltage or capacity.

Wire connections should be of No. 6 covered single strand copper or larger, because it will carry about 31 amperes.

Direct current of 110 volts is to be used. The positive wire is to be connected with the positive terminal of the battery and the negative supply wire is connected in parallel with 34 100 watt lights to the negative terminal of the battery through the switch as shown.

Connect all wires as shown in the cut, throw in the switch and let battery charge with all 34 lights burning until it begins to gas too freely or until the temperature of one of the middle cells approaches 110 degrees Fahrenheit. Then unscrew all but 12 of the lamps from their sockets, and let the battery charge to its capacity. With your battery this capacity should be reached in about eight hours providing the battery was fully discharged before beginning.

The total capacity of your battery is $4\frac{1}{2}$ kilowatt hours and such a charge will cost you 45 cents.

Do not use No. 14 wire.

Do not keep the 34 lights on too long.

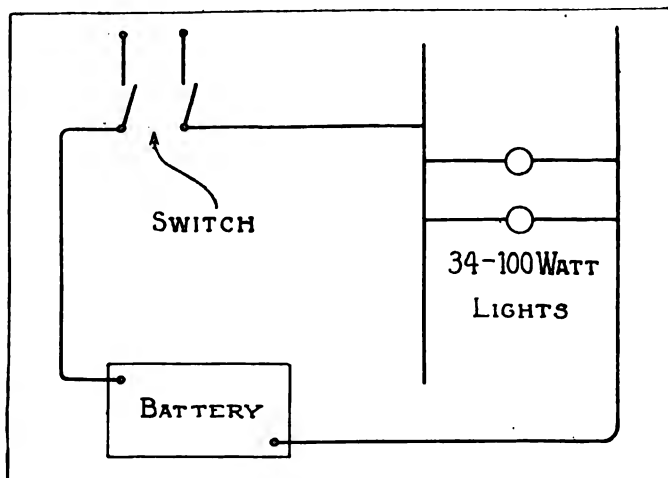


Diagram Illustrating Method of Using Lights to Charge Battery.



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Your dealer will show you just the size you need for your tool kit, or for repair work.

He will recommend the COES wrenches as all good dealers have done for fifty years.

Coes Wrenches do not break, or wear out, in service life they cost less than any other tool made.

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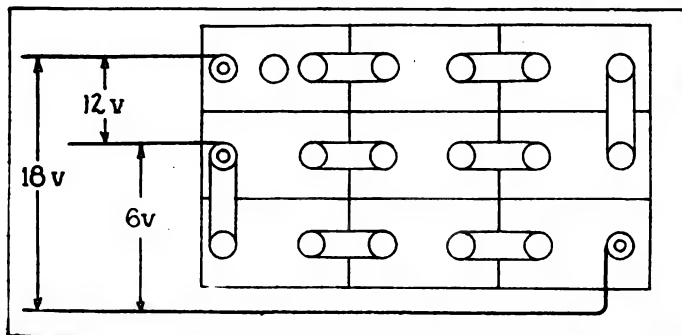


Diagram Showing Voltage Differences in the Three Wires of Nine-Cell Battery.

Do not let the temperature of the electrolyte get above 110 degrees.

Do not overcharge.

Do not let bare wires or terminals come in contact with your body.

The accompanying sketch shows the three wires from the battery and the voltage difference between either two. On the Chalmers car wires numbers 1 and 3 connect with the motor generator furnishing an 18-volt current for starting, and wires numbers 2 and 3 connect with the lighting system and furnish six volts.

Mazda bulbs will answer the same purpose as carbon bulbs. A 100 watt Mazda is equal to a 32 candle power carbon and vice versa.

RECHARGING FORD MAGNETO IN CAR.

(W. J. K.; St. Louis, Mo.)

How is a compass used in recharging a Ford magneto in car from battery?

What is a high speed and low motor and what are the advantages?

The process of recharging a Ford magneto by means of a compass and batteries while still in the machine is very intricate and difficult; a great number of batteries should be used to get results and results so obtained are seldom favorable.

We judge from your letter that your magneto does not seem to be giving proper current. Do not jump to the conclusion that it is demagnetized; this is very seldom the case. Try cleaning the contact point which screws into the top of the case just under the dash over the flywheel, unscrew it from the case and see whether it is clean or not. Quite often lint or dirt collects at this point and stops the flow of current.

Disconnect the wire leading from this point to the dash and connect a short length of wire with the point, touch it to the engine or casing while some one else turns the engine over at a moderate rate. If you get a spark while the engine is being turned over you may rest assured that your magneto is not demagnetized.

If you find that it gives no spark and that the magneto is demagnetized, a cheaper proposition for you will be to buy new magnets from the factory. By trying to magnetize them yourself you are very apt to ruin all of the coils of electro magnets and the steel magnets.

In practise an automobile engine running below 1500 revolutions per minute is considered as a low speed engine; any motor running above 2500 revolutions per minute is considered as a high speed engine.

A comparison between the advantages of a high speed engine over a low speed engine and vice versa is a difficult subject to handle. The engines of each type are designed for a particular class of work and are so designed as to be most efficient when used for that particular class.

As an instance of this it is generally conceded that a high speed engine should be used in an aeroplane. A low speed engine is generally used for boat propulsion. This is not an arbitrary rule, however, and is used to show the difficulty of making a comparison of the relative values of high and low speed engines.

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Grease and Friction are Allies

Grease needs the aid of friction to melt it before it can lubricate. And of course *you*—the user of grease—pay the excessive toll that friction demands of its services.

But you don't need to pay it. Not if you use



It holds down friction the minute your car starts and *all* the time thereafter. It follows gears and bearings *instantly* and *always*—even in zero weather.

NON-FLUID OIL guards moving parts with a coat of lubricant that clears friction from the path of power and *reduces* the power effort necessary to propel the car. Naturally, this helps you get *more* mileage from every gallon of gas.

NON-FLUID OIL is a money-saving, trouble-saving lubricant. It should be in your car all the time.

Get "K-oo Special" grade for gears; "K-ooo" grade for bearings.

Write for booklet "Lubrication of the Motor Car."

New York & New Jersey Lubricant Co.
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Bosch

Consider This

More than two million Bosch Magnetos are being used as the ignition systems on just as many automobiles, motor boats, motorcycles and gas engines. That fact alone should convince you of the necessity for insisting that the car or engine you buy should be

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Service Stations in Every State

It Smothers the Bump



Hartford
BUMP ABSORBER
— more than a bumper

THE NATIONAL GUARD FOR MOTOR CARS
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ELECTRIC LIGHTING SPECIALTIES Made to Order
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"SUPERIOR" or a "COSY" Safe Garage Heater
All air taken from outside building.
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Heavy, Medium and Light
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Allen \$850
MOTOR CARS
THE ALLEN MOTOR CO. FOSTORIA, O.

A high speed engine usually requires a finer adjustment, a better balance of rotating parts, a more efficient cooling and oiling system, better ignition and specially designed fuel system than a low speed engine.

TIMING FOR HARLEY-DAVIDSON MOTORCYCLE.

(H. W. F., Lockport, N. Y.)

Will you please give me the correct timing for the Harley-Davidson motorcycle?

Assuming that you have removed all the timing gears controlling both the magneto and the valves, the following directions apply to cylinder No. 1, which is the back cylinder. If this cylinder is timed correctly all the other cylinders will be correctly timed.

Referring to the accompanying sketch, gear No. 1 is the gear which is keyed on the crankshaft. Its proper location is fixed by its key. Gear No. 2 has the valve cam cast on the back. Gears Nos. 3 and 4 are idler gears and require no special setting. Gear No. 5 is keyed on the magneto shaft. Its proper location is fixed by its key. The oiler gear may be meshed at any position of the drive gear.

Procure a heavy piece of wire, remove the spark plug in No. 1 cylinder and insert wire, touching the piston head. Turn the engine over until it is at the extreme bottom of its stroke and make a mark on the wire with a file at a point even with the outside top of the cylinder. For convenience we will call this mark "A" (see cut). Turn the engine over until the piston is at the extreme top of its stroke and make a mark on the wire as above; this is mark "B." Remove wire and

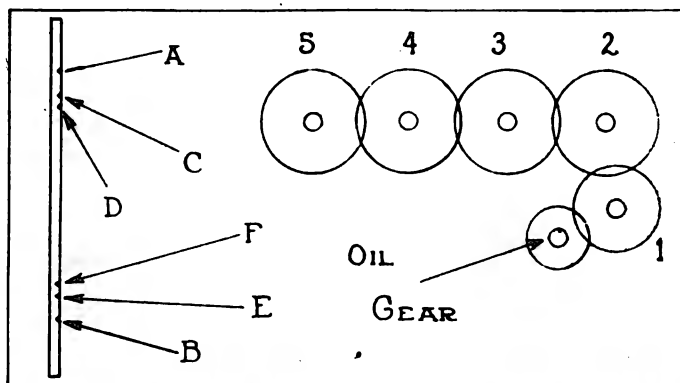


Diagram to Illustrate Method of Timing Harley-Davidson Motorcycle.

make a mark on same at "C" $\frac{9}{16}$ inch below "A;" a mark at "D" $\frac{1}{4}$ inch below "A;" a mark at "E" $\frac{1}{4}$ inch above "B" and a mark "F" $\frac{5}{16}$ inch above "B." Insert wire into cylinder again.

Turn engine forward until the piston on its down stroke reaches point "D." Place cam gear No. 2 on its stud and turn until the exhaust valve is about to open. Gear No. 1 is now put into place and the gears will mesh at some point indicated on the wire between "C" and "D."

If the above directions are followed the exhaust valve in No. 1 cylinder will open at a point between $\frac{1}{4}$ and $\frac{9}{16}$ inch before the piston reaches the bottom of its stroke.

Set spark at full advance. Turn engine over forward until the intake valve opens on the down stroke and then turn again in the same direction, until the piston reaches the point "F" (this will be near the top of what is termed the compression stroke). Next place gear No. 3 on its pinion. Place gear No. 5 on the magneto shaft and turn until the points in the breaker box are about to be broken by cam marked No. 1 on the magneto. Gear No. 4 may now be placed into mesh by rocking the engine between points "F" and "E" on the wire.

If the above directions are followed the cam marked No. 1 in the breaker box of the magneto will cause the points to snap at a position of the piston between $\frac{1}{4}$ and $\frac{5}{16}$ inch before the piston reaches the top of the compression stroke, with the spark set at full advance.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

CARE OF A STORED CAR.

(F. J. M., New York, N. Y.)

In laying up a car for three or four months during the winter in an unheated garage, is it necessary or advisable to put a half and half solution of kerosene oil and cylinder oil in the cylinders?

If the engine is run once a week so as to keep the storage batteries charged, is there any danger of the batteries freezing?

It will not be advisable or necessary to put a half and half mixture of kerosene and oil in the cylinders. Being comparatively air tight there is no danger from rust forming on either the pistons or cylinder walls. If you intend to run the engine once a week it will be kept in the best of condition without any further trouble.

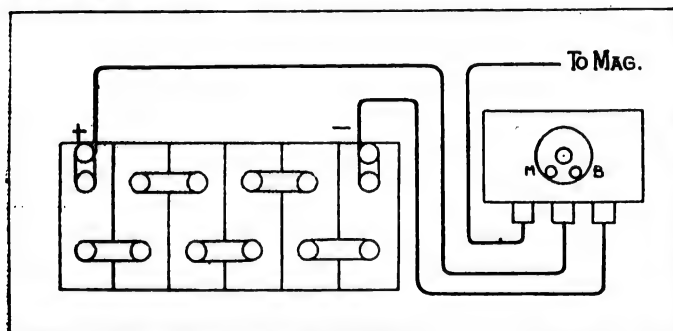
You will find if you put about a tablespoonful of kerosene in each cylinder while the engine is warm, let it stand for about five minutes and run engine for about five minutes, that some of the carbon has been removed by this procedure.

The electrolyte will not freeze while the battery is in condition. We would suggest that you have the battery kept in condition at some service station, however. To keep the battery charged by running your engine will cost considerably more than the charge of a service station.

SIX CELL BATTERIES ON FORD CARS.

(E. W. C., Westmoreland, N. Y.)

Can I use a U. S. L. 6 cell 12-14 volt battery on my Ford car with the coil box for ignition? Shall I use three of the cells or all six?



Wiring Diagram for Battery Ignition on Ford Car.

The 12-14 volt U. S. L. six cell which you have may be connected with the coil box on your Ford car, as shown in the diagram. All six cells should be used.

NEGATIVE AND POSITIVE WIRES.

(W. J. W., Westboro, Mass.)

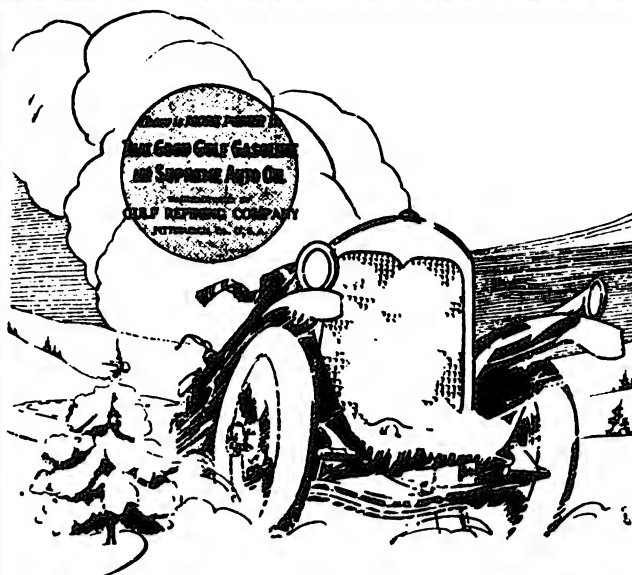
How may I connect up wires from receptacle placed on car to direct current, available to charge storage battery?

If the receptacle is a standard one the inner ring should be negative and the outer ring positive; if this is not the case the proper change should be made to meet these conditions. The leads to the storage battery should be properly marked + and -. To locate the positive + and negative - wires you will find the following method most practical:

To the battery terminal wires attach short lengths of copper wire. Dip the latter into a tumbler of water in which has been dissolved about two tablespoonfuls of salt and by holding these terminals about half an inch apart it will be noted that a great number of bubbles rise from one, while a few if any rise from the other. The wire with the greatest number of bubbles clinging to it is the negative or - wire. This wire should be connected to the pole marked - on the storage battery and the other to the + connection.

It has been assumed in the above answer that the direct current you have available does not exceed the voltage output of the battery to be charged, and that you have already brought about this result by the proper introduction of lights or other proper resistance.

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**Supreme Auto Oil**

Flows Freely at Zero. Starts With the Engine.

This is most important during the winter months. You should know whether the oil you are using "flows freely at zero." All oils do not possess this feature—notably the paraffine base oils, which thicken up under cold and often cause great damage to the motor.

The safe way is to ask for SUPREME AUTO OIL—it "Flows Freely at Zero" and leaves less carbon, owing to the fact that it is a Southern Asphalt-base oil containing no paraffine to gum, stick or thicken.

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INFERIOR PLUGS
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can be bought at the same price? They overcome all Engine troubles, fire where others fail and Add Power to engine. Any length point desired made to order. Try them and you will use them always. Make a trial and save money. \$1.00 each, 6 for \$5.00.

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Inter-State Motor Co.,

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ELCAR

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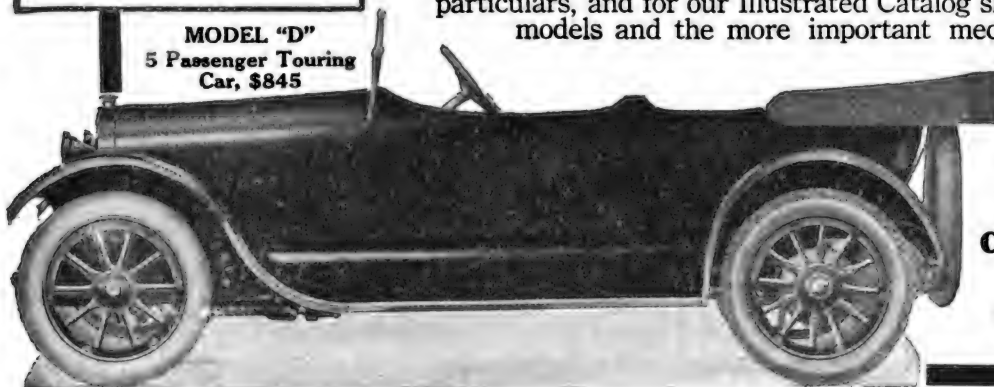
The Elcar at \$845

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A Few Elcar Specifications

Wheel Base—As long as some cars selling up to \$3,000 and more—115 in.
Motor—4-cylinder; long stroke; high speed; 34.7 h. p. at 1,800 r. p. m.
Fuel Supply—Stewart vacuum system.
Ignition—Delco automatic spark advance with manual control.
Starting and Lighting—Dyneto two-unit; double-bulb headlights; Willard storage battery.
Clutch—Dry multiple disk—seven plates, steel on Raybestos.
Rear Axle—Full-floating with roller bearings at each end of wheel hubs.
Differential—Spiral bevel driving gears, with roller main bearings and ball thrust bearings.
Brakes—Internal and external, two inches wide on 12-inch drums.

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5 Passenger Touring
Car, \$845



Looks better than its price, and is just as good as it looks. A car of distinctive beauty, well designed, well built, well finished—a car in which quality speaks right out.

Three Models at One Price

Five Passenger Touring Car Four Passenger Touring-Roadster
Two Passenger Roadster

Secure it for your territory We want to place our proposition before live dealers in territory not already assigned. Write us for particulars, and for our Illustrated Catalog showing all ELCAR models and the more important mechanical parts, and describing the construction of the ELCAR even down to its small details.

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Carriage & Motor
Car Company

6811 Beardsley Avenue
 Elkhart, Indiana

HIS CAR BECOMES OVERHEATED.
 (J. S., Sugar Notch, Penn.)

My 1915 car overheats by driving. Can you tell me the cause?

We give you herewith a list of the many causes, any of which may cause the trouble.

Poor water circulation. This may result from an insufficient supply of water in the radiator, a choked up, or caked up radiator. Take radiator from car, flush well with water under pressure if possible, examine connections and in general see that water system is clean. If radiator pipes seem to be filled with sediment, a radiator repair man should be consulted.

Oiling system failure. The oil pump may need repairing, the oil pipes may be clogged up; a stiff piece of copper wire will help clean out small tubes. If oil pump does not work well do not neglect to have it repaired.

Tight bearings. Tight bearings some times are the cause of overheating. The remedy is obvious; loosen them.

Carbon. Carbon in cylinders retains the heat of explosion and causes preignition.

Over-retarded spark. After starting, spark should be advanced as far as possible at all times, unless engine knocks. Late ignition causes overheating.

Clogged muffler. Muffler should be free from soot and products of incomplete combustion.

All exhaust passages should be clear and exhaust valves should open properly, about 30 degrees before bottom centre. Incorrect valve timing will cause overheating.

The distance between the valve stem and the push rod or valve lift should be about the thickness of printing paper when the valves are closed. If the exhaust valve is held open overheating will develop.

Do not race the engine when running on low speeds.

ADJUSTABLE STEERING WHEEL BOTHERS.

(A. E. L., Middletown, Conn.)

I have just purchased a adjustable steering wheel for my Ford car. When the car is running straight ahead the

(When Writing to Advertisers, Please Mention the Automobile Journal.)

steering wheel spider comes in the way of my hands. Can I turn the spider without having a new keyway cut in the pinion of the wheel?

It will not be necessary to cut a new keyway. The spider may be turned to suit the operator by following this method.

On the top of the Ford steering column will be found a case which carries the quadrants. This case contains three small spur gears mounted on a triangular spider which connects directly through the steering column with the steering toggle. Into these three gears meshes the pinion gear, mounted on its short pinion, which is fastened to the spider in question on the steering wheel. The cover to this case screws off from the main column, and by unscrewing same it is only necessary to lift off steering wheel, remesh the gears in the position you desire and return cover as originally found.

LOSES POWER ON HILLS.

(P. J. C., Norwood, Mass.)

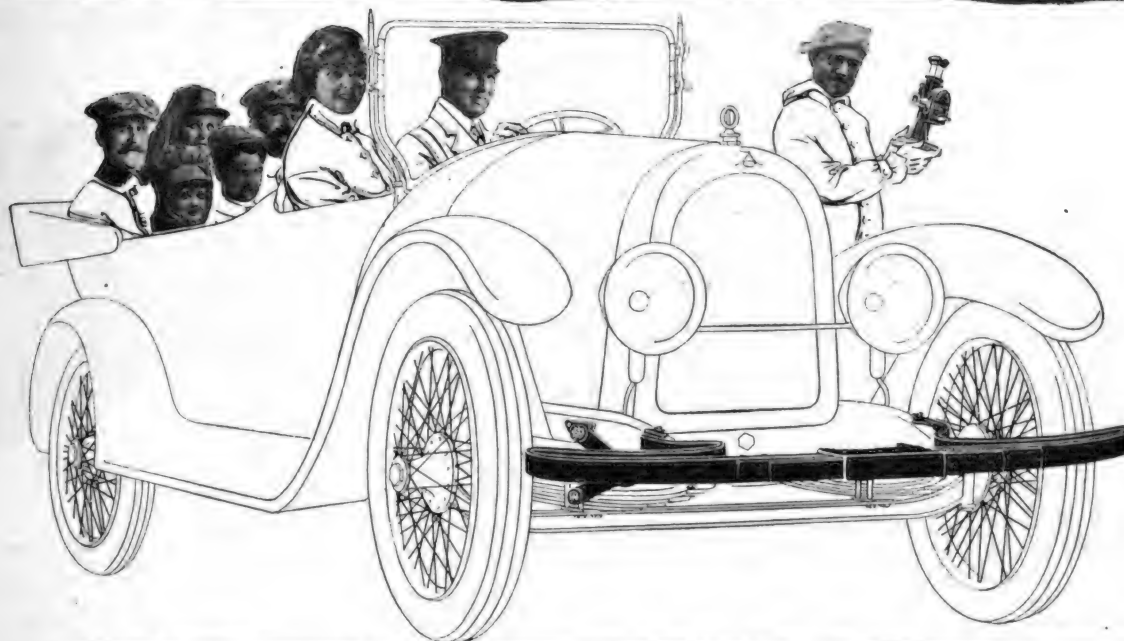
What makes my car loose power when accelerator is opened or throttle is opened in starting up a hill?

If you are using a Stromberg carburetor on this car you will probably find that the adjustment marked "High Speed" is not properly adjusted. This adjustment should be such that when the throttle is open the roller beneath it should open it by lifting it up; but at an idle position this valve should be closed. Try opening this valve.

When machining metal small chips are apt to lodge in the hands of the workman. Many times these sink so deeply under the skin that they are difficult to locate even by using a magnifying glass. Under these conditions a strong magnet can be used to advantage. Place it over the painful part of the hand. By looking through the magnifying glass the splinter, which will be partly drawn out by the attraction of the magnet, will be plainly visible. It can be removed by a pair of tweezers.

INTRODUCING

The Ryders, their Chauffeur and the Racing Driver.



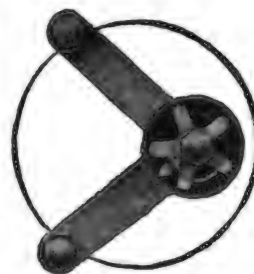
Over 30 Millions of Readers

will follow the experiences of these advertising characters, truly representative of the 400,000 and more users of the

Hartford

SHOCK ABSORBER

Makes Every Road a Boulevard



Each will tell a story of exceeding importance to all who sell or own automobiles. Watch this publication.

Learn from the Ryders, their Chauffeur and the Racing Driver what the famous pioneer shock absorber is doing for hundreds of thousands of well-pleased users.

All, who use it, like the Hartford Shock Absorber, as you will when you have tried it—and this you can do, assured by our time-honored guarantee of **Satisfaction or Money Back.**

EDWARD V. HARTFORD, Inc.

Heretofore Known as Hartford Suspension Co., 147 Morgan St., Jersey City, N. J.

Makers of the Hartford Shock Absorber, E. V. Hartford
Electric Brake, Hartford Auto Jack, Hartford Bump Absorber

Branches: New York, 1846 Broadway and Service Station, 1926 Broadway; Boston, 319-325 Columbus Avenue;
Chicago, 2637 Michigan Avenue

Distributors in principal cities. Dealers everywhere.

In Every Test

made by the Engineering Departments of sixty-nine leading car manufacturers in which all makes of plugs were tried out



Spark AC Plug America's Champion

These High Class Cars Are AC Equipped

Cadillac
Pierce-Arrow
Packard
Marmon
Hudson
Chalmers
Hupmobile
Haynes
Peerless
Dort
Cole
Reo
Paige
Saxon
Stutz
Dodge Brothers

Stephens
Velie

Buick
Oakland
Oldsmobile
Jeffery
KisselKar
Premier
Knox
Jordan
Liberty
Crane-Simplex
Pilot
McLaughlin
Canada
Stearns-Knight
Singer
National
Jackson
Westcott

Look for the AC
Burned into
the Porcelain



Pathfinder
Chandler
Chevrolet
Apperson
Davis
Daniels
Detroitter
Paterson
McFarlan
Bour-Davis
Lexington-Howard
Scripps-Booth
Signal Truck
Sandow Truck
Sterling Truck
Chase Truck
Netco Truck
White

Moreland Truck
Republic Truck
Diamond T Truck
Gramm-Bernstein Truck
Brockway Truck
United Truck
Wilcox Trux
Gabriel Truck
Murray
Monroe
Federal
American-La France
FourWheelDrive
Anderson
G. M. C.
Abbott



Follow the Lead of
the Leaders. They
have done the ex-
perimenting for you

The Standard Spark Plug of America

Champion Ignition Co., Flint, Mich., U. S. A.

MR. DEALER:
Can you think of another motor
part used by as many high class
manufacturers as AC Plugs?



Our Reputation is Your Guarantee

VERSAL PRODUCTS

FOR THE

UNIVERSAL CAR

DETROIT STARTER COMPANY
DETROIT, U.S.A.



Electric
Tail Lamp



Spotlight



Head Lamp
Bulbs

Head Lamp
Control

Dimmer
Switch



Storage Battery



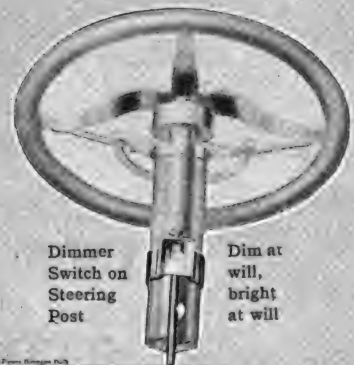
Electric Side Lamps



Generator

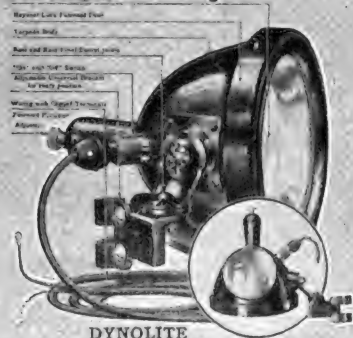


Regulator



Dimmer
Switch on
Steering
Post

Dim at
will,
bright
at will



DYNOLITE

The Perfect Ford Spotlight



Extra 24 c. p. Nitrogen Bulbs



Head Lamp Control

Genolite Type C and D ▽ Constolite — Dynolite

Genolite Type "C" \$29.85

An improved electric lighting system for lighting all five lamps, heads, sides and tail—gives brilliant light from storage battery in both side and tail lamps (which we furnish) irrespective of whether motor is running or idle. Provides also two nitrogen head-light bulbs lighted through patented regulating device which governs flow of current taken from magneto, giving more constant light at low engine speeds and can be dimmed at will at high speeds. Installed in two hours.

Genolite Type "D" \$31.85

Includes the following—a storage battery—a generator with "cut out" which automatically charges the battery—two beautiful side lamps with bulbs—one high grade tail lamp with bulb—one high grade windshield spotlight with bulb—one coil box for automatically regulating spotlight—which also automatically dims headlight. Together with necessary wires, brackets—absolutely complete, ready for installation. No extras needed. Installed in two hours.

Dynolite \$6.85

A powerful windshield spotlight designed exclusively for Ford cars. Cannot be excelled for the quality of material throughout, its many exclusive features and the exceptional power and brilliancy of its light. Operates off magneto through patented regulator which automatically delivers current at the proper voltage, keeping light constant in power irrespective of motor speed. Only two terminal connections to make installation.

Constolite \$4.85

Gives a full driving light at practically all speeds—light in both head lamps at all times. Wired in multiple to prevent burning out—dimmer switch conveniently located on steering post—an exclusive feature found in no other device control. All wires, two extra bulbs and dimmer switch provided. Installed in few minutes.



SEE THIS WONDERFUL EXHIBIT AT THE BOSTON AUTOMOBILE SHOW
MARCH 3-10, BOOTH No. 527

PETTINGILL ANDREWS COMPANY,

Boston, Mass.



Perfect Electric Lighting for Ford Cars

(When Writing to Advertisers, Please Mention the Automobile Journal.)

Digitized by Google

MOTOR PRODUCTS CORPORATION



Five Big Companies Reorganized as One

In the Motor Products Corporation of Detroit continues the business of the Diamond Manufacturing Company, the Rands Manufacturing Company, the Vanguard Manufacturing Company, the Superior Manufacturing Company and the Universal Metal Company—all formerly well and favorably known concerns in their respective lines.

We believe the Motor Products Corporation stands as a particularly unique organization in the history of automobile building, for at no time before has a number of healthy and growing parts concerns reorganized into one big active manufacturing company. Furthermore, we believe the Motor Products Corporation is an organization of great importance to automobile and truck manufacturers, because of the increased economies of production and the betterment of service to customers effected through conducting manufacturing operations in one large unit, under one centralized management.

The Motor Products Corporation is continuing to manufacture the same high quality products formerly marketed by the constituent companies—hub caps, radiator parts, wind-shields, tubing and other accessories—in its huge new Detroit factory. Branch factories are located at Ann Arbor, Mich., and Walkerville, Ont.

MOTOR PRODUCTS CORPORATION DETROIT, MICHIGAN

W C. Rands
President
H. H. Seeley
Vice-Pres. and
Director of Sales

D. B. Lee
Treasurer and Gen'l Mgr.
C. F. Jensen
Vice-Pres. and
Director of Purchases

R. R. Seeley
Production Manager
M. L. Brown
Secretary

Successors to
Diamond Mfg. Co. Vanguard Mfg. Co.
Rands Mfg. Co. Superior Mfg. Co.
Universal Metal Co.

(When Writing to Advertisers, Please Mention The Automobile Journal.)

The Car With New and Different Finishes

Allen

Thousands of People will inspect Allen Classic Cars at the Boston Show.

And almost all will see at once that the Allen is different from other cars. Furthermore they'll like this difference.

That was the way it went in New York and Chicago—"That's good, I like it. Its smart looking and the finish is sensible."—is a comment typical of the many. What is different about the Allen?

THE FINISH

Allen Classic Colors disregard the conventional dark toned body finishes—classic brown, blue and maroon, with harmonizing upholstery, cream wheels and just enough of glossy black details to set off the whole.

And don't get the idea that they look like new art posters or anything else freakish. Allen classic finishes are not only wholesomely attractive, they are extremely sensible and practicable also in that they don't easily show dust or mud spatterings.

Of course, you'll make it a point to see them at the Show.

But the appeal of the Allen Classic Car is more than in looks. It is mechanically strong and sound and serviceable.

Has plenty of power—is light in weight, therefore economical—is roomy and rides very comfortably.

Complete Allen Exhibit at the Boston Show

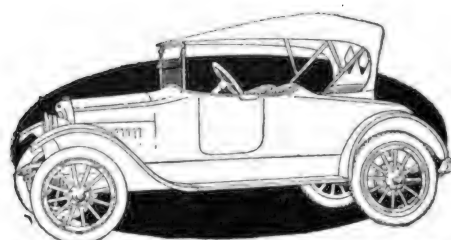
37 H. P. 34x 5", 4 cylinder motor. Two unit Westinghouse starter and lights. 112 inch wheelbase—55 inch springs. Weight—2300 lbs. All prices f. o. b. Fostoria.

GOOD TERRITORY AVAILABLE TO ESTABLISHED DEALERS.

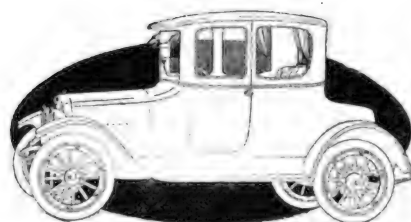
THE ALLEN MOTOR CO.

402 Allen Building,

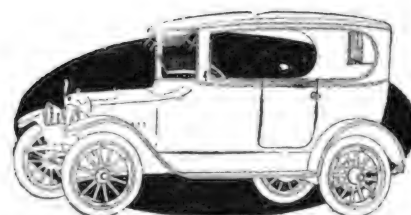
FOSTORIA, OHIO



ALLEN CLASSIC ROADSTER. Four passenger.....\$875

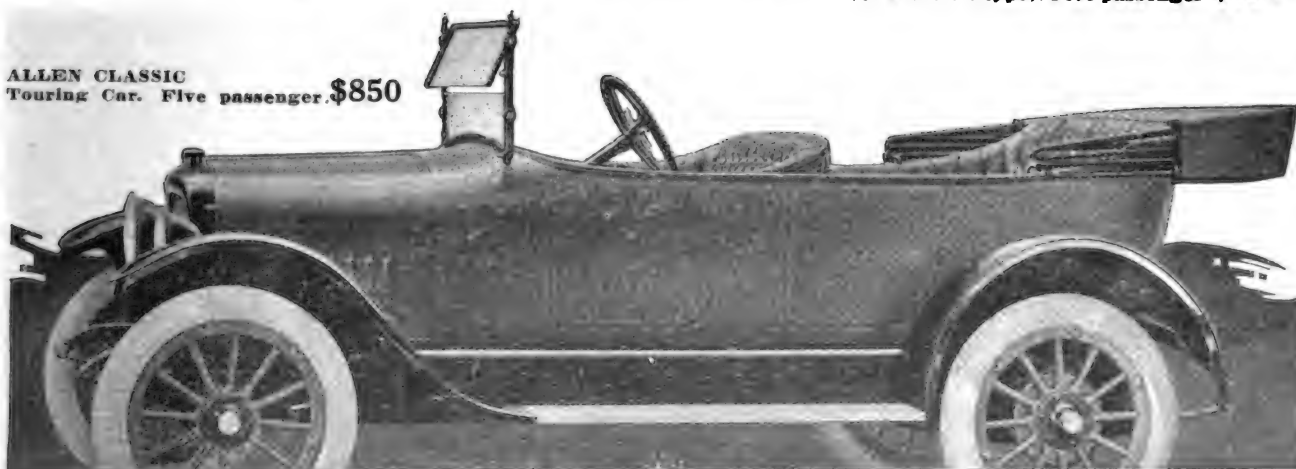


ALLEN COUPE Three passenger.....\$1175



ALLEN SEDAN (Convertible type). Five passenger \$1195

ALLEN CLASSIC Touring Car. Five passenger \$850





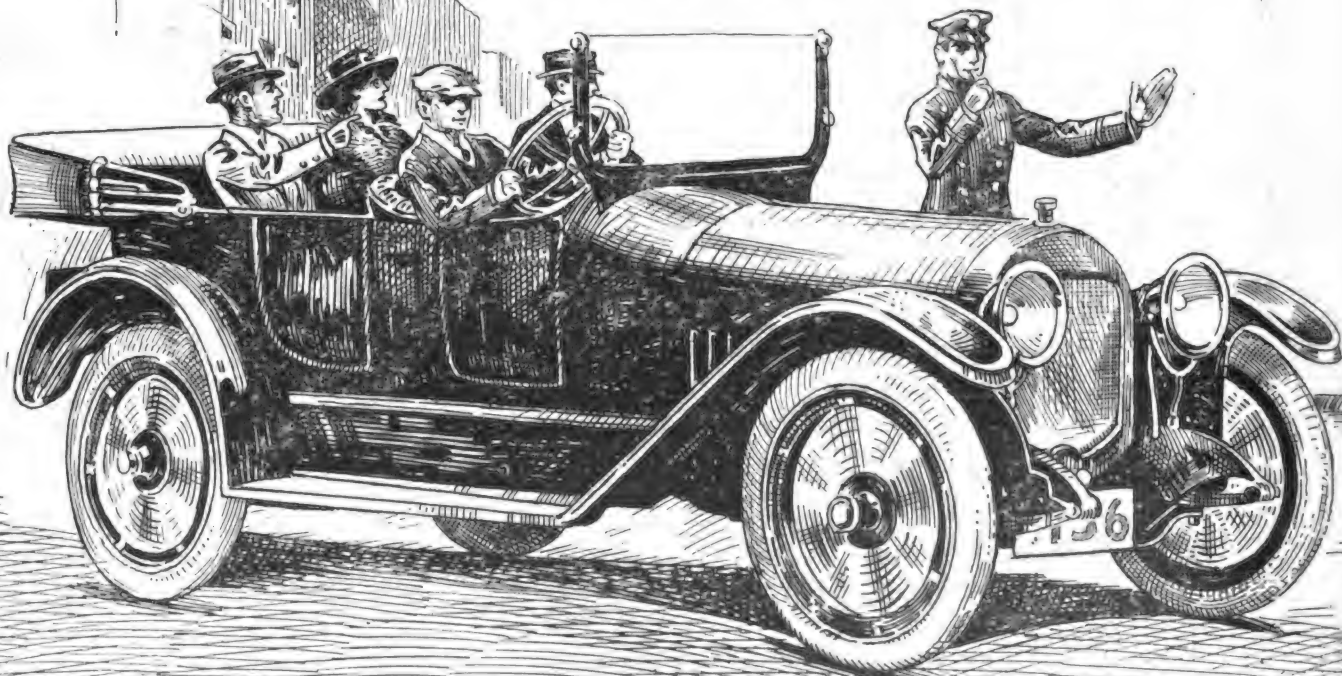

Less Oil---More Lubricity

LESS lubricant is necessary when you use EAGLEINE MOTOR OILS, the engine will develop more power and the cost per mile for lubricity is reduced. Not only this, the engine is better maintained, has greater flexibility and requires practically little attention for from 10,000 to 20,000 miles. This statement is proven by the experience of thousands of users.

EAGLEINE MOTOR OILS are the most economical of any lubricants. The working parts are adequately protected against wear and the cost of maintenance is greatly reduced. And, besides, there's the added satisfaction of fullest car service.

EAGLEINE MOTOR OILS will not soot. Their use obviates carbon trouble. You get all there is in the engines, and at less expense and without care.

EAGLEINE MOTOR OILS are sold in sealed containers, there being a grade for every engine type, that can be obtained of all good dealers and in any quantity. The trade mark protects the consumer and the trade. A trial will convince you that you can save money. When ordering, specify EAGLEINE MOTOR OILS.



(When Writing to Advertisers, Please Mention the Automobile Journal.)



Less Oil---More Miles

EAGLEINE GEAR OIL is as efficient, will have the same marked degree of economy and will afford you as much satisfaction as any other lubricant bearing the Eagleine trade mark.

It is a heavy oil, scientifically compounded for use in transmission and differential gearsets; but, unlike grease, it will not solidify when subjected to low temperatures.

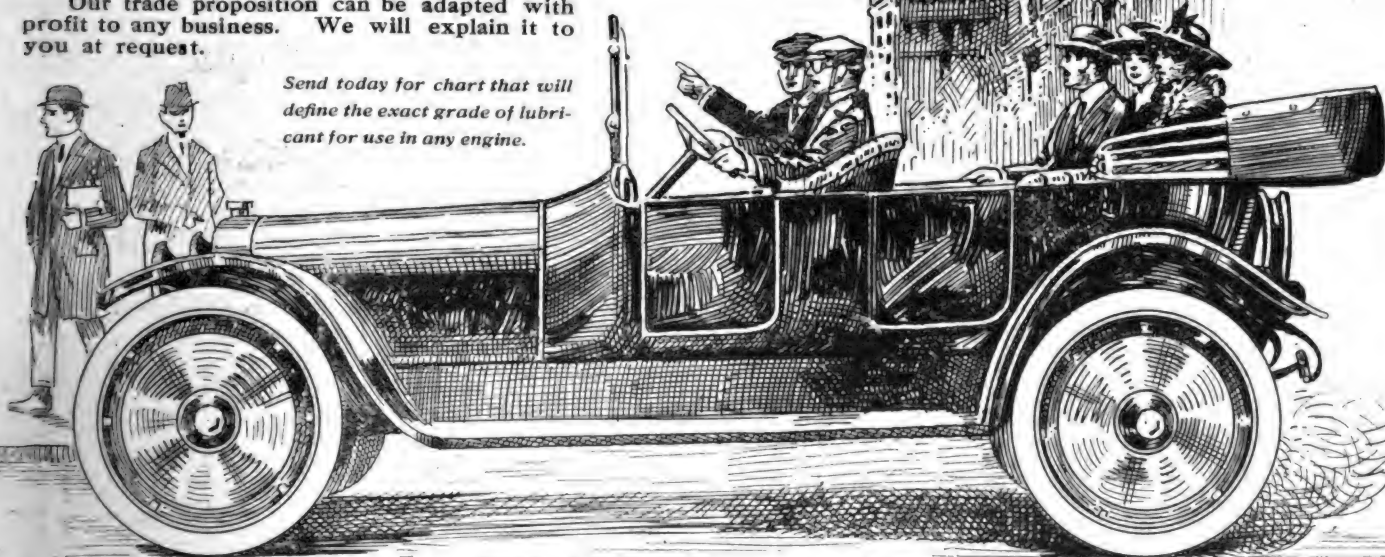
It affords the same quality of lubrication to the last drop. It adheres to the gears and, covering them with a cushion, protects them from wear and prevents friction.

Its use is insurance against wear. With it the car will operate easier. It is cheap because it is a preventive of repair bills.

EAGLEINE GEAR OIL is sold by all reputable dealers in sealed, trademarked containers. These containers insure you satisfaction and economy of car service.

Our trade proposition can be adapted with profit to any business. We will explain it to you at request.

Send today for chart that will define the exact grade of lubricant for use in any engine.



EAGLE OIL AND SUPPLY Co.

44, 45, 46, INDIA STREET,
NEW YORK CITY
Woolworth Building.

BOSTON, MASS.
CHICAGO
1132 W. 37th St

(When Writing to Advertisers, Please Mention the Automobile Journal.)

Peerless Eight

Peerless
All that the name implies



Two Separate Power Ranges

The Peerless Dealer's Big Advantage

Everyone wants a really fine car—but few feel that they can afford an expensive car and a heavy operating cost.

The Peerless Eighty Horsepower Eight is recognized universally as one of the few really fine cars—yet it is not an expensive car.

And it is distinctly one of the very few truly great cars.

The Peerless dealer gives an irresistible demonstration.

The Peerless Double Power Range is as fascinating as it is practical.

It captivates the most indifferent prospective driver—makes driving a delight for even those who think they have had every motoring thrill.

And when a prospective buyer appreciates the combination of economical operation with extravagant performance—it's a sale.

Its wonderful softness, quietness and flexibility in its "loafing" range—its dash, speed and super-power in its

"sporting" range give the Peerless a contrasting performance—a dual personality—which completely captivates.

Can you think of any car with such big outstanding selling advantages?

Do you know that the success of this car has led us to double our production?

Are we represented in your vicinity?

Would you like to have a car to sell that is different and better, demonstrably so?

Write us about it.

Prices

On orders accepted by the Factory for shipment, until February 28th, 1917, Roadster, \$1890; Touring, \$1890; Sporting Roadster, \$2250; Coupe, \$2700; Sedan, \$2750; Limousine, \$3260

On orders accepted by the Factory for shipment, after February 28th, 1917, Roadster, \$1980; Touring, \$1980; Sporting Roadster, \$2250; Coupe, \$2700; Sedan, \$2840; Limousine, \$3350

All prices f. o. b. Cleveland are subject to change without notice

The Peerless Motor Car Company, Cleveland, Ohio

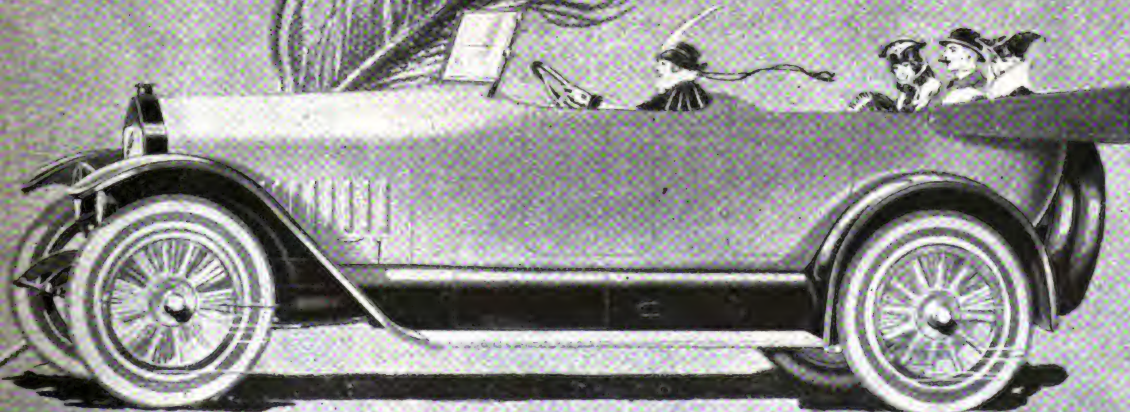
(When Writing to Advertisers, Please Mention The Automobile Journal.)



National
HIGHWAY
Six or Twelve Cylinder Models
Six \$1750—Twelve \$2150

The world at large recognizes the National as a favorite car of discriminating individuals who want *something better*. The real beauty of a National (in the dealer's eyes) is the fact that the majority of car owners can now own this aristocrat of motor cars.

NATIONAL MOTOR CAR &
VEHICLE CORPORATION
Seventeenth Successful Year
INDIANAPOLIS





Automobilists Need These Tools

When your car occasionally breaks down on the road, or when overhauling it in the spring, or doctoring it up in your garage over the week end, you will need many handy tools which are not supplied by car manufacturers. Many car owners have found that

Starrett Tools

get them out of all sorts of difficulties in repair work. The handy tools shown here should be in every automobile owner's kit.

Some of the Starrett Tools for the automobilist are ratchet wrenches, expansion pliers, hack saws, calipers and dividers, rules, combination squares, gages, screw drivers, etc. Our free catalog No. 217 describes these tools more fully. Drop us a postal requesting it.

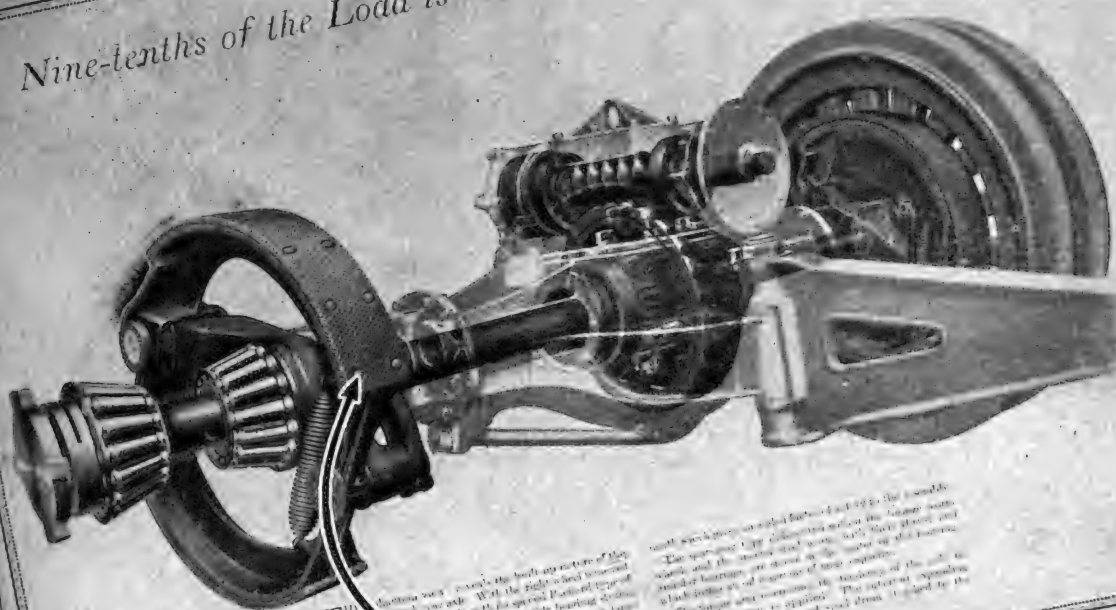
Starrett Tools are sold at all good hardware stores.

The L. S. STARRETT CO.,
The World's Greatest Toolmakers,
 ATHOL, MASS.

42-8254

(When Writing to Advertisers, Please Mention the Automobile Journal.)

Nine-tenths of the Load is Carried on this Massive Rear Axle



The massive rear axle of the PACKARD truck may truthfully be said to carry nine-tenths of the load. With equal truth—the massive inherent strength of the small strip of multibestos guards the safety of the entire load.

The tribute implied in the above illustration is full repayment for our years of constant effort in the determination to produce the best possible Brake Lining. Such an endorsement is also a guarantee of quality to the growing army of Multibestos users. Again we say: JUDGE MULTIBESTOS BY THE COMPANY IT KEEPS.

MULTIBESTOS

TRADE MARK REGISTERED

The tribute implied in the above illustration is full repayment for our years of constant effort in the determination to produce the best possible Brake Lining.

Such an endorsement is also a guarantee of quality to the growing army of Multibestos users.

Again we say: **JUDGE MULTIBESTOS BY THE COMPANY IT KEEPS.**

Standard Woven Fabric Co.

Factory: Walpole, Mass.

N. Y. Branch & Export Office, 1779 Broadway
 Boston, 175 Massachusetts Ave. Philadelphia, 1309 Race St.
 Chicago, 1432 Michigan Ave. Atlanta, 6 West Harris St.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

BOSTON AUTOMOBILE SHOW

March 3-10, inclusive

10 A. M.---10:30 P. M.

**THE LARGEST AUTOMOBILE EXHIBITION EVER
STAGED IN AMERICA**

Mechanics' Building

Horticultural Hall

THE EXHIBIT OF PLEASURE CARS will be larger in number of displays, number of makes, number of types than any of the previous fourteen annual shows.

THE ACCESSORY DEPARTMENT will exceed in number and character of exhibits any show ever held.

THE TRUCK DEPARTMENT will be the greatest exhibition of service vehicles ever made in the world.

Admission 50 Cents

Automobile Salon

COPLEY PLAZA HOTEL

OPEN MONDAY, MARCH 5

11 A. M.—11 P. M.

**MOST GORGEOUS ARRAY OF PLEASURE CARS
EVER EXHIBITED IN NEW ENGLAND**

Admission \$1.00

Personal Direction CHESTER I. CAMPBELL

(When Writing to Advertisers, Please Mention the Automobile Journal.)



The Rand Reflector

Gives 50 Per Cent More Light

Doubles the actual illuminating power of automobile headlights by projecting the light where needed—eliminating glare and waste of candle power—throws the light downward and projects it far ahead.

Non-Breakable—100 Per Cent Efficiency

The Rand Reflector is a paraboloid reflector so constructed and arranged that no ray of light reflected therefrom will be projected in an upward direction. Thus 50 per cent. increase in illumination on the road where your light is needed is secured and road obstructions are visible 300 feet and more ahead.

The Automobile driver in a fog is hindered and annoyed by the illumination caused by the particles of moisture acting as prisms refracting back all light reflected upwards. The RAND REFLECTOR will positively overcome this objection and penetrates the densest fog. The RAND REFLECTOR when installed becomes a permanent part of the headlight, taking the place of the original reflector.

DEALERS! The Rand Reflector is a good selling proposition, for it answers to a positive demand of long standing among motorists. It does away with any need for the expensive and costly attachments that reduce glare by diminishing the light. Economy and safety dictate its use. Our selling terms are liberal.

Manufactured by

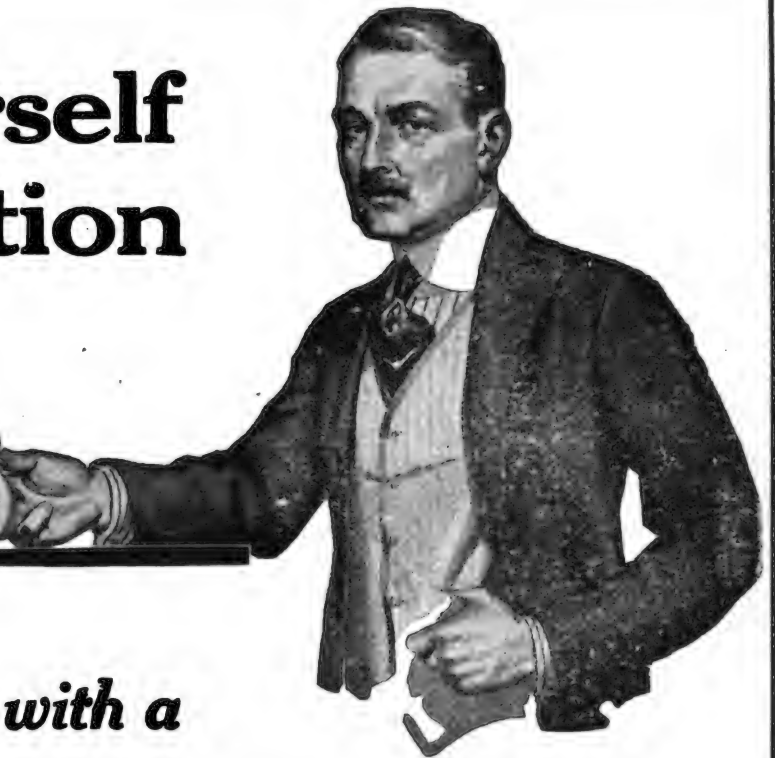
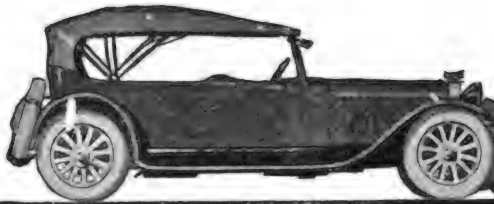
RAND REFLECTOR COMPANY, Inc.
HAVERHILL, MASS.

Sold by
The Aerofram Company, Inc.,
107 Mass. Ave., Boston, Mass.

Distributors for Canada.
Northern Electric Co., Ltd.,
Montreal, Canada.



Ask yourself this question



*If I replace my
present carburetor with a*

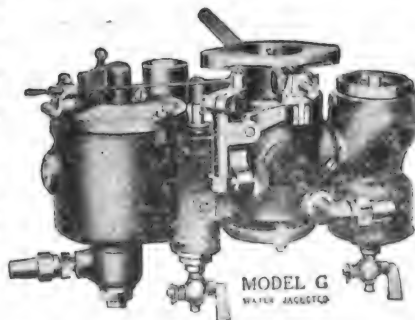
RAYFIELD

CARBURETOR

How much more value will I get out of my car?

Here's the Answer

It will give you 20 to 50 per cent more miles per gallon—give a wide range for speed or idling with standard adjustment—give excess power for speed or hill climbing—quick pick-up, quick starting and acceleration. There are over 600 Rayfield service stations in the United States.



Here's the Guarantee

Every Rayfield is guaranteed to render "unconditional satisfaction" to its owner. Dealers are authorized to sell it under this guarantee and to return purchase price without question within 30 days from date of purchase.

Findeisen & Kropf Manufacturing Company

2127 Rockwell Street, Chicago

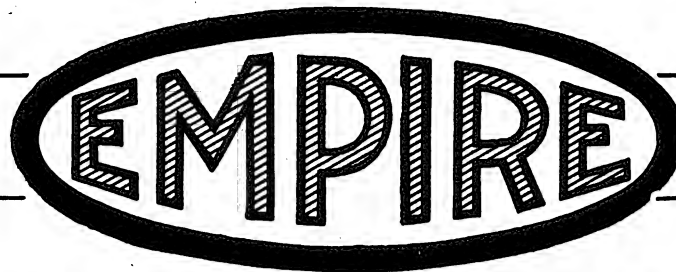
BRANCHES:

1140 Michigan Avenue, Chicago

1902 Broadway, New York

(When Writing to Advertisers, Please Mention the Automobile Journal.)

Four \$960



Six \$1235

AT THE BOSTON SHOW

Compare the New Empire Models With Other Cars in the Same Price Class

We believe your judgment will coincide with the overwhelming verdict of the year, that Empire cars possess a superiority of style, a distinctive gracefulness of body lines, which place them in the front rank of automobile beauty.

These models embody every convenience. Plenty of room for the driver and passengers. A maximum of riding comfort—light in weight—economical in operation—reliable in service.

Full of snap and go for the open road with astonishing flexibility for city driving and ample power for every road condition.

You will agree with us that Empire cars represent extraordinary motor car values.

DEALERS:

The Empire line for 1917 offers you exceptional opportunity to connect with a Company that has been building quality cars at moderate prices for eight years.

We want dependable dealers in some unclosed territory. If you are looking for a line of motor cars that will enable you to compete successfully in your territory and make you money, let us hear from you. We advise early action.

Here is the complete line for 1917—every one an incomparable value at the price:

Model 70—Six cylinder touring car - -	\$1235	Model 45—Four cylinder touring car - -	\$ 960
Model 70S—Six cylinder touring car - -	\$1625	Model 51—Four cylinder Speedster - -	\$1165
Model 60R—6 cylinder, 4 passenger Roadster - - -	\$1145		

Read the chassis specifications of these models and we know that you will want to see these cars at the show

"SIX"

Motor—Empire-Continental high efficiency Six. **Ignition**—Magnet type distributor of battery current. **Carburetor**—Stromberg Model H. **Clutch**—Adjustable dry plate disc type. **Transmission**—In unit with motor. Three forward speeds. **Rear Axle**—Full floating with spiral drive gears. **Steering**—Left side. Irreversible type gear. **Wheelbase**—120 inches. **Fuel Supply**—Vacuum system of feed. **Springs**—Front—semi-elliptic; Rear—three-quarter elliptic. **Electric System**—Two-unit Auto-Lite starting and lighting. **Tires**—34"x4" with non-skid type on rear. **Equipment**—Complete in every detail.

"FOUR"

Motor—Empire-Teetor 40 h. p. T-head type cylinders. **Ignition**—Magnet type distributor of battery current. **Carburetor**—Stromberg Model H. **Clutch**—Dry plate disc with full adjustment. **Transmission**—In unit with motor. Three forward speeds. **Rear Axle**—Floating type with extra heavy gears and shafts. **Steering**—Left side. Irreversible type gear. **Wheel Base**—116 inches. **Fuel Supply**—Vacuum system. **Springs**—Semi-elliptic in front and rear. **Electric System**—Two-unit Auto-Lite starting and lighting. **Tires**—33"x4" with non-skid type on rear. **Equipment**—Complete in every detail.

F. A. DUTTON MOTOR CAR CO., Inc.

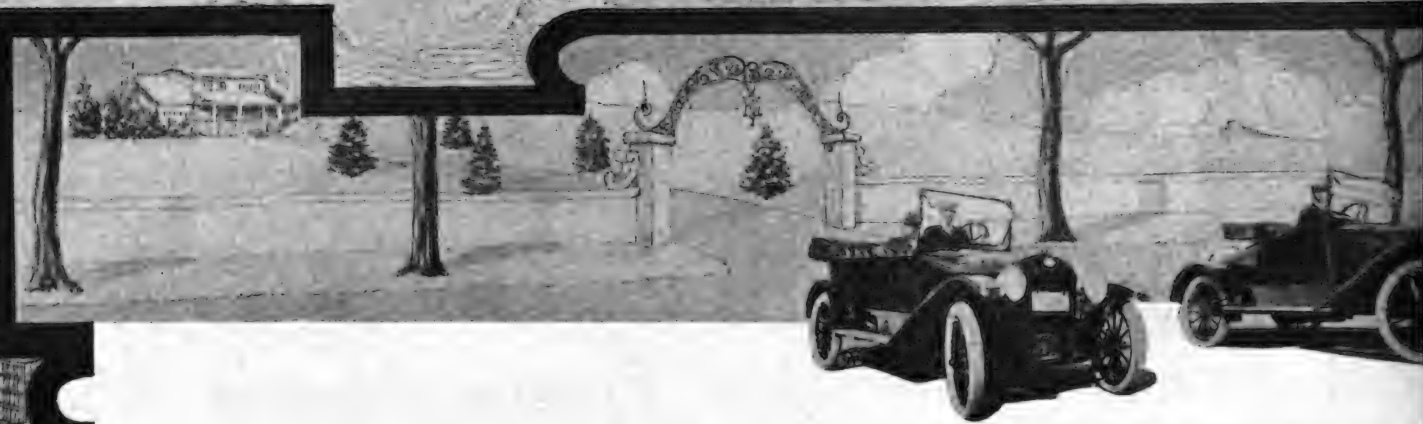
New England Distributors

Salesroom, Service Department and Garage, Ball Square, West Somerville, Mass.



EMPIRE AUTOMOBILE CO. INDIANAPOLIS, U.S.A.





19 MID ROADSTER C

\$600



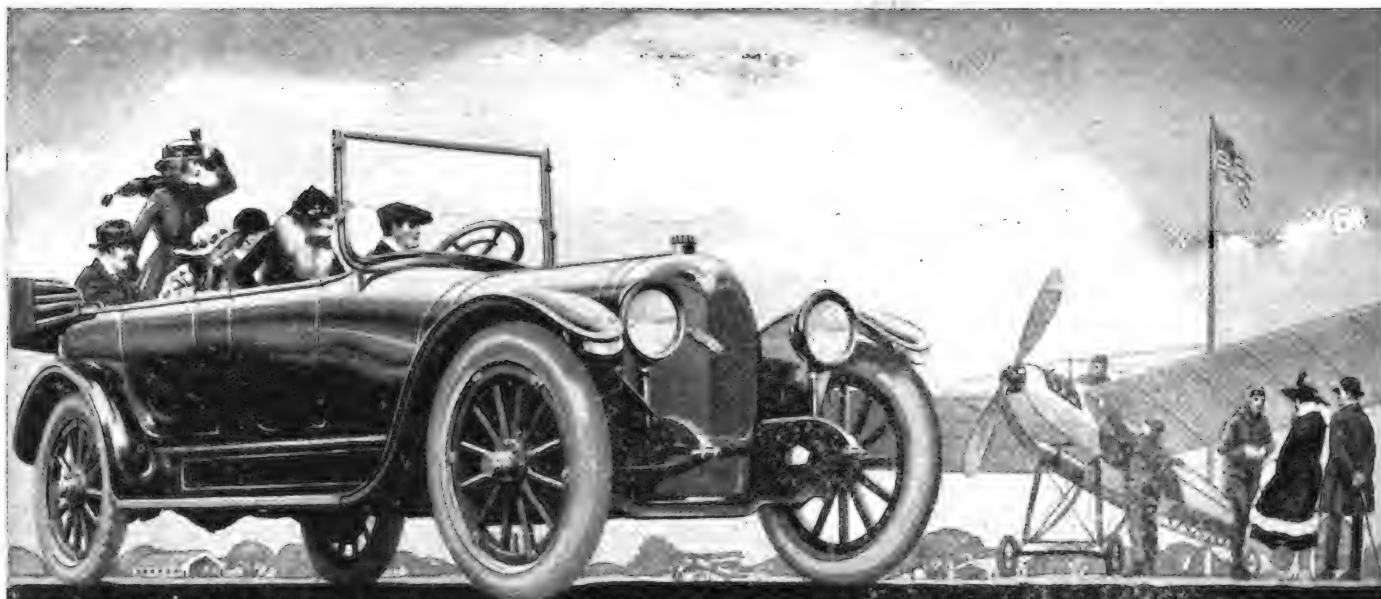
METZ COMPANY



17
TZ
TOURING
AR
CO.

METZ COMPANY

WALTHAM, MASS.



APPERSON ROADPLANE

ALL Apperson cars have gained their fame through *meritorious performances*—in the hands of owners **ON THE ROADS**—the *true test of efficiency*. Those who drive them say they closely resemble the “flight” of an aeroplane through space, because of the **EASE** with which they glide over the roads.

The easy riding properties of these cars are due to clever designing (long wheel base—130 inches), proper balance and light weight—only 3000 lbs. Remember that a well designed, well balanced, light-weight car is a *low up-keep car*. **No other cars have done so much to reduce the cost of motoring as Apperson Roadplanes.**

All Apperson cars are built complete in Apperson factories (the most complete of any in the world), under the direct supervision of Elmer and Edgar Apperson. Four models are offered:

6-Cylinder, Four-Passenger Roadster,	\$1,750 Gold	Code Word Kalot	8-Cylinder, Four-Passenger Roadster,	\$2,000 Gold	Code Word Malot
6-Cylinder, Seven-Passenger Touring Car,	\$1,750 Gold	Kalaet	8-Cylinder, Seven-Passenger Touring Car,	\$2,000 Gold	Malaet

Cost of boxing for export and freight charges to New York, \$92 per automobile.

We have a very interesting financing proposition to place before responsible automobile dealers in all parts of the world where we are not represented. Full details will be furnished upon request together with complete catalog in English or Spanish. Write us today if interested.

APPERSON BROTHERS AUTOMOBILE CO.
308 MAIN STREET

KOKOMO, INDIANA, U.S.A.

CABLE ADDRESS - JARAB

SEATING
PLAN



CHUMMY
ROADSTER

(When Writing to Advertisers, Please Mention the Automobile Journal.)

A NEW BRISCOE

Success has
Made it

40 per cent
more power

At Boston
Auto Show

THE new Briscoe at \$685 we believe is the best looking, the sweetest running automobile ever built at the price. Increased production has lowered cost, provided more refinements.

THE Half-Million Dollar Motor with its rotary balanced crank-shaft, its larger bore,—coupled with the fact that it is the longest long stroke motor—gives over one-third more power. You will like this Briscoe for nothing is lacking in finish, appearance or equipment.

BE sure to see the Briscoe exhibit of handsome 1917 models during your visit to the Boston Auto Show. You will miss the real meaning the Show holds for you if you fail to view these latest, greatest Briscoe cars. You'll like their surprising roominess, accessibility, easy-to-understand controls as well as the larger Half-Million Dollar Motor and many important advancements.

Four Body Styles—Touring, \$685; 4-passenger Club Roadster, \$685; 2-passenger Runabout, \$685; Delivery Car—(with canopy top) \$700; with panel body \$725.

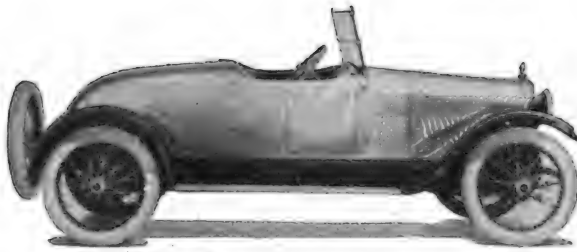
BRISCOE MOTOR CORPORATION
Department 36 JACKSON, MICHIGAN

BRISCOE \$685
The Car With The
Half-Million Dollar Motor **FULLY EQUIPPED**

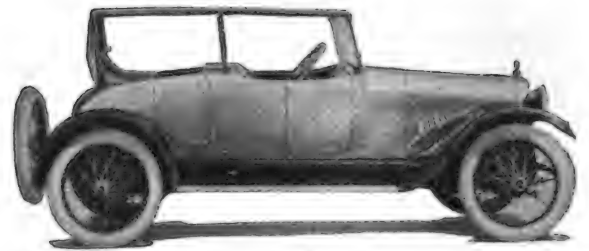
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PAIGE

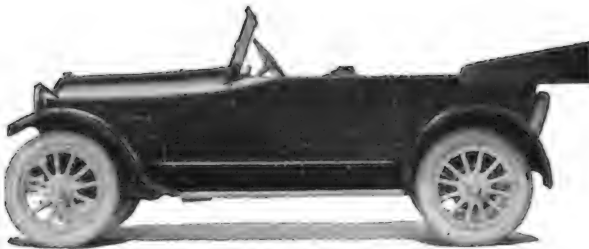
The Most Beautiful Car in America



Brooklands with top down—rear compartment closed



Brooklands "Six-51" \$1695 f. o. b. Detroit



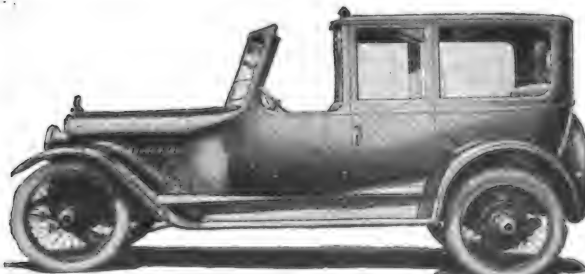
Linwood "Six-39" 7-passenger. \$1175 f. o. b. Detroit



"Six-51" Sedan \$2300 f. o. b. Detroit



"Six-51" Limousine \$2750 f. o. b. Detroit



"Six-51" Town Car \$2750 f. o. b. Detroit

Here Is The What Does It

On these pages we tell our story—in our cars.

You see the Paige Line for 1917. No doubt you already realize what the overwhelming demand for these cars will be—must be.

No doubt, you already realize that each of these cars—each "The Most Beautiful Car in America"—each of unchallenged quality and mechanical excellence—will be supreme in its price-class.

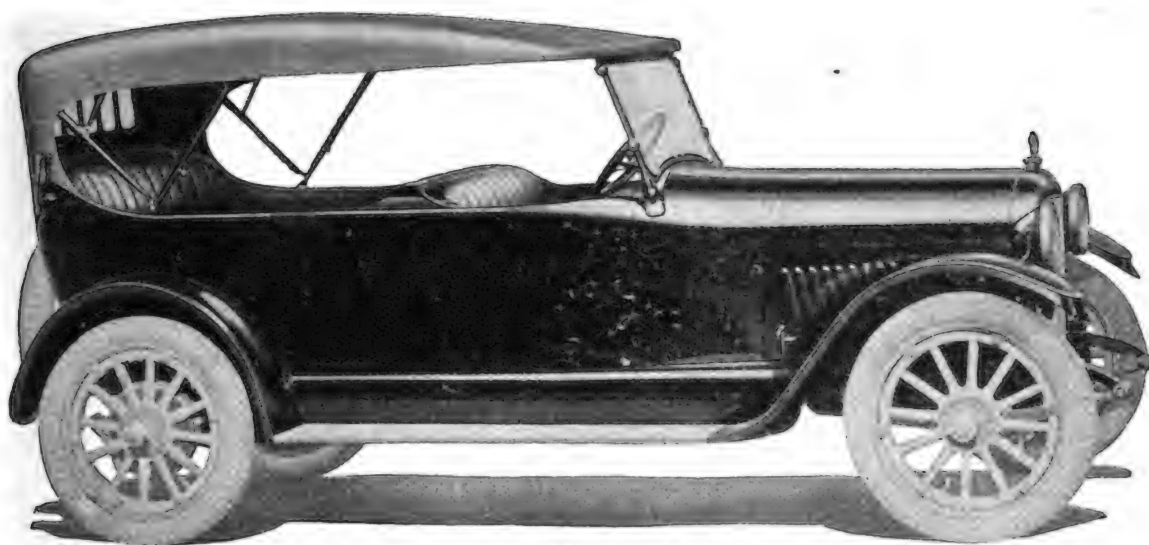
No doubt, you already realize what a line of such breadth as well as worth, will offer to every Paige Dealer in sales possibilities; how with such a line every Prospect for a motor car should be and can be sold a Paige.

Perhaps, you know that it was the American people themselves who voluntarily bestowed upon the Paige the title of "The Most Beautiful Car in America." We did not originate that title. They made and gave it to us.

PAIGE-DETROIT
DETROIT

PAIGE

The Most Beautiful Car in America



Stratford "Six-51" 7-passenger, \$1495 f. o. b. Detroit

Paige Line Mean To You?

Does that not show you how deeply Paige Cars are entrenched in the minds and hearts of the motor car owners and buyers of the country?

Judging from past Paige Success, what must be Future Paige Success?

Last year, the year before, every year, Paige Dealers were the big money-making dealers of the industry.

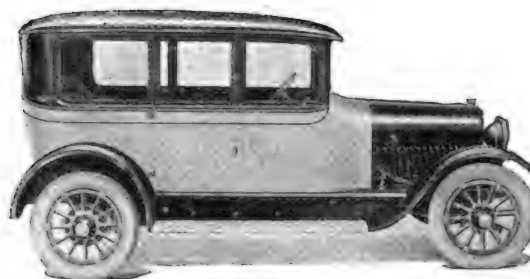
Last year the growth of the Paige Dealer organization was exactly one hundred per cent.

With such a line as you have already seen, with "The Most Beautiful Car in America" to sell, with every condition more favorable than ever before in the history of American motor cars.

What will the Paige Dealership mean in Profits in 1917?

You can answer the question for yourself.

**MOTOR CAR CO.
MICHIGAN**



"Six-39" Sedan \$1775 f. o. b. Detroit



"Six-39" Dartmoor \$1175 f. o. b. Detroit



"Six-51" Coupe \$2100 f. o. b. Detroit



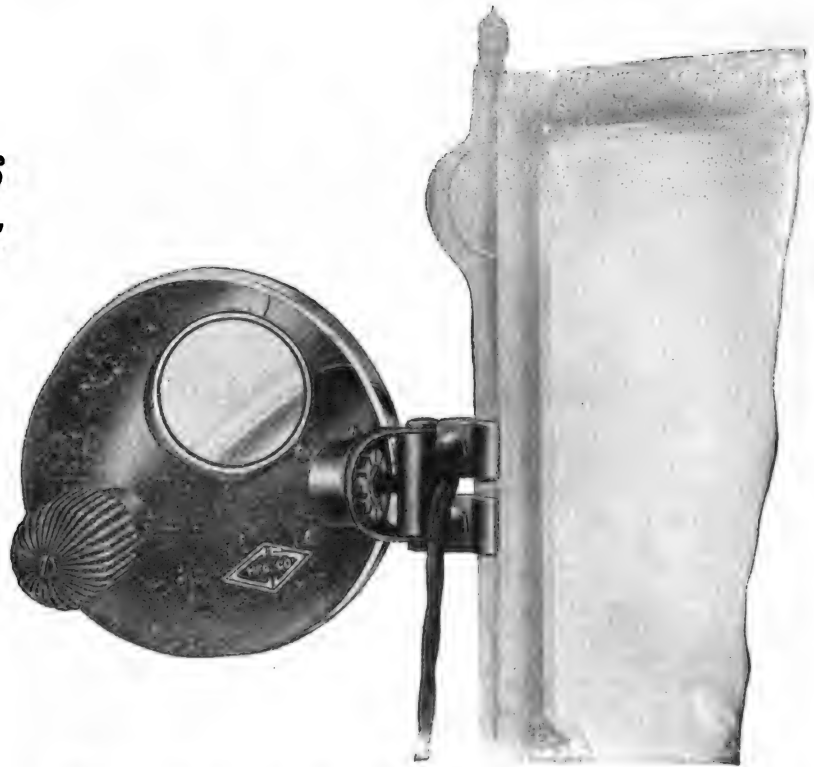
Giant Searchlight

A real, honest-to-goodness Searchlight

List Price:

With Mirror \$6

Without Mirror \$5



The Ideal Light for Your Car

An equipment of wonderful efficiency, that in design, material, workmanship, finish and appearance is absolutely the best ever obtained in lamp construction.

The Culver-Stearns Giant Searchlight affords every desirable or necessary quality. It is an essential in any well equipped car.

The list price is very moderate when measured by other lamp values, but the lamps are made to C-S standards in every detail. The quality insures to you the greatest utility and complete satisfaction.

The lamp shell is black enamelled steel. The reflector is silver plated over nickel on brass. The lamp is perfectly balanced in the pressed steel bracket and will remain wherever placed. The handle operates a switch that is specially constructed, cannot fail, cannot be broken, and there is no button to break or lose. The lamps are Mazda C (gas filled) only.

There is large profit in being a Culver-Stearns dealer. Fulllest trade information at request. The discounts will surprise you.



It will project a powerful ray from any position. Is instantly operated by hand.

CULVER-STEARN'S MFG. CO.

Main Office and Factory
Worcester, Mass.

Sales Office
Detroit, Mich.

(When Writing to Advertisers, Please Mention the Automobile Journal.)



Indispensable
to YOU
Mr. Dealer

THIS catalogue is indispensable to dealers in supplies and cars, to garage owners and repair shops, as a reference book and the means to secure business. It illustrates in detail all products of the Bosch Magneto Company, magnetos, starting and lighting systems, spare parts of present and former types---and all other products we distribute.

This book represents the most comprehensible help that could be offered you. It will be sent free upon request to established dealers, garages and repair shops.

MOTOR PARTS COMPANY

187 Columbus Avenue
Philadelphia

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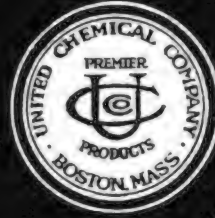
Springfield

BOSTON, MASS.
Buffalo

"A PREMIER PRODUCT FOR EVERY MOTORISTS' NEED"



PREMIER PRODUCTS



Premier Automobile Body Polish

It is used and highly endorsed by a great many of the largest car makers. They recommend its use to their dealers, on both new and old cars.

Aside from high efficiency of Premier Body Polish it is extremely economical, as one-half the usual amount of other similar preparations is needed to clean and polish any like surface.

While it cleans and polishes it affords a lasting protection to the finish, giving a durable, brilliant and transparent lustre.

It holds the finish of the new car to factory appearance, and revives the lustre and finish of old cars.

For every day use in public and private garages, liveries fire departments, railway coaches, steamships, etc.

Premier Body Polish can be applied with a sprayer or soft cloth. It contains no acid or alkali. It forms a transparent wax like finish, that will not catch or hold dust or grit. It protects the finish from destructive action of road oils, tar, salt air and the elements. It is just as serviceable and satisfactory for cleaning and polishing furniture, pianos, hard wood floors, etc.

It is a trade marked, guaranteed product, sold in sealed containers, by all garages, automobile and hardware supply houses.

Premier Enamel Cleaner

A scientifically prepared cleaner and polish universally used. It almost instantly cleans and polishes all baked enamel surfaces such as fenders, fillers, hoods, etc. It revives the original finish and is guaranteed not to contain any acid, alkali or grit.

When applying wet a piece of cheese cloth with water to which add Premier Enamel Cleaner. Perfect results are easily obtained.

Premier Specialties save time, money and effort, and are sold at moderate prices. They can be bought in quantities to meet any requirement.

Order from nearest dealer or direct.

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Chandler
Locomobile
American-La France
Jackson
Lozier
Oldsmobile
Dodge
KisselKar
Paige
Ross
Hupmobile
Inter-State

List of Users

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Pierce-Arrow
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Franklin
Scripps-Booth
Oakland
Cole
Stutz
Standard



UNITED CHEMICAL COMPANY
BOSTON, MASS.



At Every Show the Grant Six Dominates Its Price Class

GRANT SIX

**Five-Passenger
Touring Car.**

**Three-Passenger
Roadster.**

\$875

F. O. B. CLEVELAND

Evidence of the fact that the Grant Six is the greatest six-cylinder value below a thousand dollars is continually piling up.

Perhaps one of the most noticeable testimonies is the remarkable attention accorded the Grant Six at all the Shows.

But still more strikingly conclusive are the swiftly growing sales. Every Grant dealer has interesting proof of the fact that Grant value is forging Grant sales up to the front row.

That one little word "Compare" does the trick.

When buyers begin making comparisons and sifting facts for themselves they are bound straight for the Grant Six.

There is no alternative.

The wonderful overhead valve motor with its surplus of power; the full floating rear axle; the extra long springs; and the tremendously strong list of mechanical features that indicate the best at every point, and the beautifully finished Grant body; all are convincing value facts.

The kind of Facts that pull buyers.

And, when you consider the records of the car in the service of users—Its splendid performance in all sorts of tests; its marvelous economy; its comfort; its style; its durability in service; its reputation—

All mean sales—greater sales—continued dominance.

Thus the reason back of the new model factory with its modern equipment and its capacity for the production of 35,000 cars is plainly disclosed.

Summed up it spells Grant Value.

Value for the dealer as well as for the user. And this is why Grant dealers are making money and why Grant sales are growing.

GRANT MOTOR CAR CORPORATION

Cleveland, Ohio

CHANDLER SIX

\$1395

(F. O. B. Cleveland, Ohio)

Chandler Dealers Are Prosperous

THEY are prosperous because the natural demand for Chandler cars is large.

Chandler demand is large because the car is so good, and because so many people know it is so good, and because it is so moderately priced.

The Chandler leads quite as distinctly in quality and in price for 1917 as it has always led.

In the face of advanced cost of all materials and labor, the Chandler price is but \$100 higher than two years ago. And the car is finer than then. Not a feature has been cut out of it. Much has been added.

Meanwhile, other cars in the Chandler field have advanced as much as three hundred dollars within the past year. The public must judge whether such large advance has been occasioned by necessity or by a desire to take advantage of an opportunity.

The Chandler Company has been unwilling to inflate the Chandler price.

So, with distinctive leadership in quality and price, we shall probably build and sell this year more cars than any other manufacturer building a car of even similar quality.

And Chandler dealers will continue to prosper.

See the Chandler at the Boston Show

CHANDLER MOTOR CAR CO.

3701-3731 E. 131st St.

CLEVELAND, OHIO

Export Dept., 1790 Broadway, New York City, N. Y.
Cable address, "Chanmotor."

CHANDLER MOTORS OF N. E., Inc., BOSTON, Distributors

Jackson

"No hill too steep—
No sand too deep"

There is a big demand for the "Wolverine Eight." See it at the Boston Show and you will understand why. Get these facts:

The more you know about eights and the more you know about motor cars in general the quicker you will be to appreciate the points that are making the "Wolverine Eight" the most popular and quick-selling car ever built by the Jackson Automobile Company.

We invite your attention to two important factors in this success—the Ferro-Jackson motor, and the pleasing variety of beautifully finished, well-built bodies offered in connection with the Wolverine eight chassis.

The Ferro-Jackson motor is creating an amazing interest in the Jackson car. It is the first American-designed, V-type, eight-cylinder motor with enclosed overhead valves without cages.

It is the first eight as well as the first V-type motor to be cast with both cylinders and upper half of crankcase in one piece.

With a bore of 3 inches and a $3\frac{1}{2}$ inch stroke it develops more power per cubic inch of piston displacement than any motor ever built up to the present time. It is rated at 28 h. p. and shows in ex-

cess of 50 horsepower on block test at 2800 revolutions per minute.

It is economical to a surprising degree—shows an average of 17.7 miles to the gallon of gasoline on touring tests. Some owners report better than that.

And it is an exponent of the finest type of motor smoothness, flexibility, quick acceleration. It shows surprising freedom from vibration at all speeds.

You will find the body styles up to the minute. You must see them to really appreciate their extra quality.

Five-Passenger Touring Car, \$1295. Four-Passenger Cruiser, including five wire wheels, \$1395. Wood wheels \$100 less. Two-Passenger Roadster, \$1295. Five-Passenger Sedan (Demountable Top), including regular top, \$1505. Seven-Passenger Jackson-Springfield Sedan, 1995. All prices f. o. b. factory.

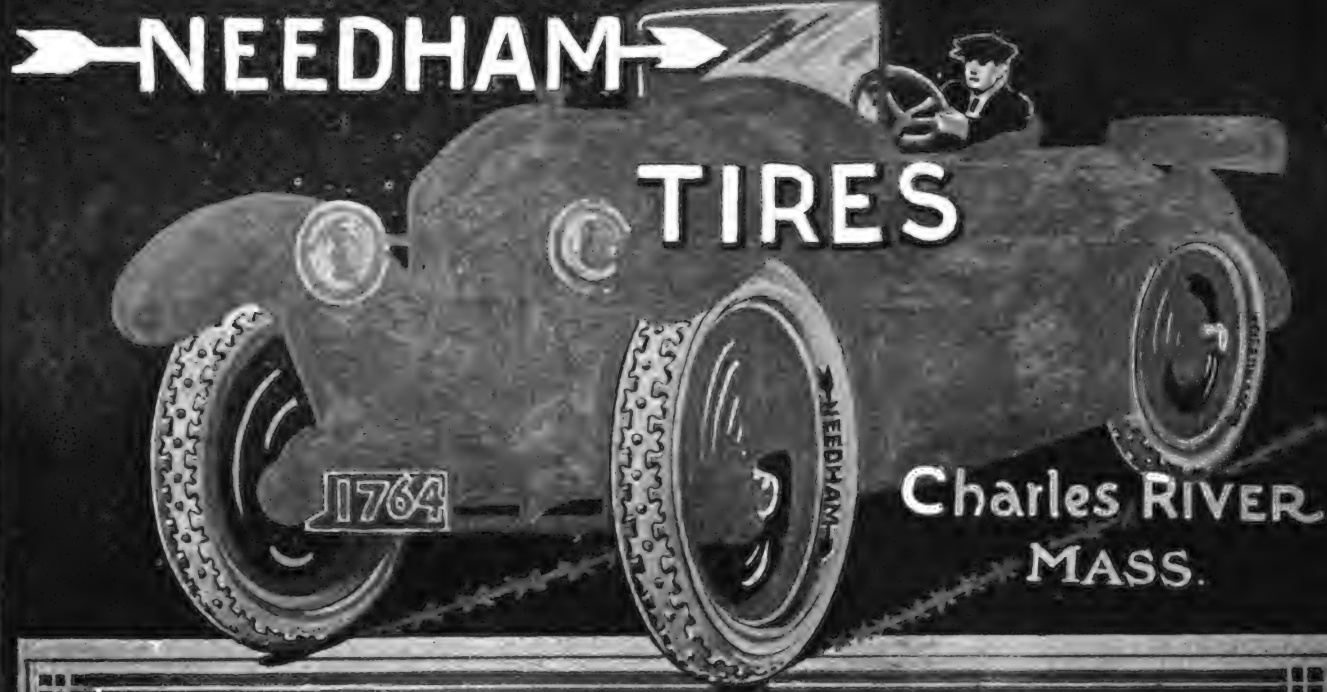
Dealers: The fifteen-year-old reputation of the Jackson Automobile Company for producing cars of strength, power, comfort and ease of riding is more than lived up to in this new model. Write and learn more of the sales opportunities offered you in the agency for this car.

Jackson Automobile Company

1229 East Main Street, Jackson, Mich.



(When Writing to Advertisers, Please Mention the Automobile Journal.)



→Needham→

smooth and anti-skid pneumatic shoes are hand made and are built with the wrapped two-cure process. They represent the highest tire value that money can purchase.

We are desirous of hearing from all good dealers who know they can sell the highest quality.

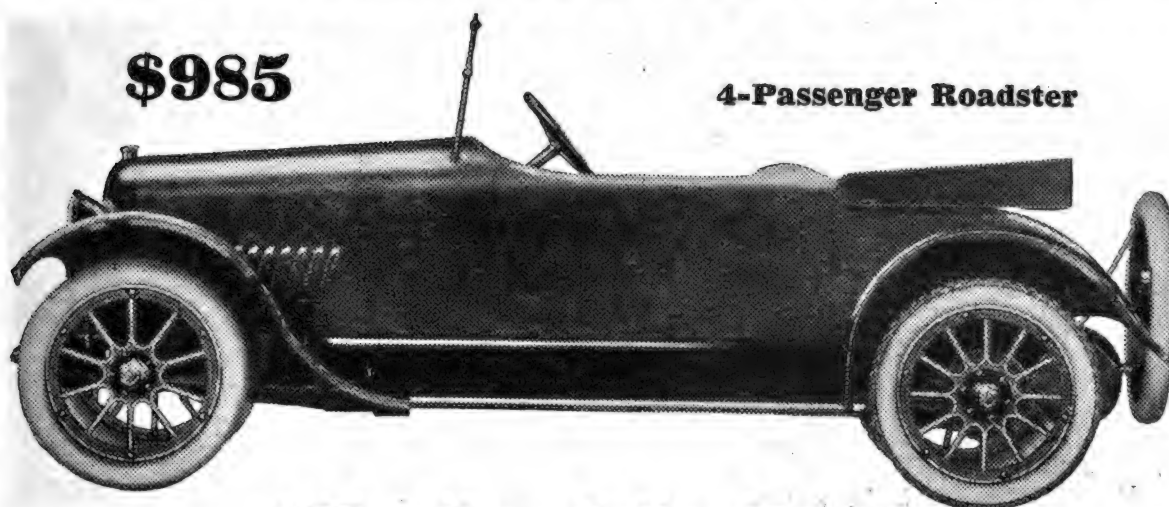
NEEDHAM TIRE COMPANY

CHARLES RIVER

: :

: :

MASSACHUSETTS



"The Car of the Hour"

5-Passenger Touring

\$985

Elgin Six

4-Passenger Roadster

\$985

DEALERS:

Measure the Elgin Six Against \$985

Your verdict will be: "Under-priced by several hundred dollars."

—Yet we are making a legitimate profit.

Note the style, size and specifications that will enable you successfully to compete with high-priced cars in quality—and beat them in price.

Consider the Elgin velvet-acting clutch, that eliminates gear-shifting and enables this "Beauty of the Road" to be started on "high" under ordinary conditions, thus removing the last obstacle to the successful handling of a motor car by women.

Note the improved cantilever rear spring suspension, found only on the Elgin Six, that has set a new standard of motoring ease and comfort at high speed. You can safely and comfortably drive the Elgin Six at 35 to 50 miles per hour over roads so rough that the average car is limited to 15 to 25 miles per hour.

And as for style and beauty—no other car selling under \$1250 has the fashionable center cowl of the high-priced European models. The beautiful yacht line design of the Elgin Six was established by a famous artist, and gives this car a distinction that sets it aside from the monotony of the common designs of average cars.

NOTE: The Elgin Six, in addition to establishing a new record of 67½ hours between Chicago and Miami, Fla., has made perfect scores and won highest economy honors in some of the most gruelling endurance and economy runs of the past year.

SPECIAL NOTICE. Our recently completed, big, modern, daylight Plant No. 2, has so increased our production that we are now entering new territory. If the Elgin Six is not now sold in your territory, better wire us for application blank and full particulars of 1917's best money making proposition for dealers.

Elgin Motor Car Corporation, Chicago, U. S. A.

Inter-State



Unchanged After Three Successful Years

**A Definite Standard of Extra Value—
Freedom From "Profit-Eating" Service—
An Undisputed Record of Economical Performance—
Have Built a Confidence in This
Line of Cars That Means a Sound,
Substantial Business For Dealers**

Primarily the Inter-State is built to return a legitimate profit to the builders. They are fully aware, however, that this profit cannot be maintained for any length of time unless their product represents a definite standard of value and offers a guarantee of performance in the hands of owners.

For the past three years the Inter-State has stood for one fundamental principle—"the best automobile it is possible to produce for the money".

For three consecutive years the Inter-State has remained unchanged—these years have been successful years—thousands of Inter-State cars in the hands of owners have made them so.

Whether you be dealer or buyer, we do not ask you to accept one proof of the value and quality of these cars, *except that which has been established by owners under actual driving conditions in all parts of the country.*

We are in a position to allot some valuable territory in Massachusetts and Western Maine to the right parties. Write or wire today for our dealer plan.

We will exhibit a complete line of Inter-State cars at the Boston Show, March 3-10

INTER-STATE BOSTON CO.

Massachusetts and W. Maine Distributors

167 Massachusetts Avenue

BOSTON

They know that the tire mileage of Inter-State cars is remarkable—

They know that they can expect a gasoline mileage of 17 miles or better—

They know that the comfort of Inter-State bodies and the easy riding qualities are all that can be asked—

They know the Inter-State valve-in-head motor is ready to meet their every demand for power—consistently, dependably, and at the same time economically developed—

They know that normally and properly cared for, their Inter-States will not drain the pocketbook through unreasonable service charges—

And they also know that an Inter-State in any one of its six distinctive bodies offers Extra Value in Power, Comfort, Beauty and Accessibility combined with an economy of operation which eliminates any chance of the investment involving a high yearly depreciation.

Tire Adjustments Guaranteed FREE

If you are buying tires you want full value. If you are selling tires you want to give your customer full value. Tire adjustments can be made easy and also satisfactory to both parties if exact mileage records are available. Our Motorist Record makes it possible to keep this record with least amount of trouble and the Records are free to Owners and also to Dealers and Garages for distribution to customers. All that is necessary fill out coupon below and mail today. The offer will not be repeated.

The Record contains tables for all kinds of car records, showing both efficiency and cost.

Owners' Coupon

Enclosed find stamped addressed envelope for free copy Motorist Record.

Name

Address

Name of Car

Do you do own repairs?

Buy tools from..... A. J.

Dealers' Garage Coupon

Please send free of all charges 50 Motorist Records which we will distribute to owners.

Name

Address

Do you stock tools for resale.....

Name of jobber..... A. J.

WALDEN-WORCESTER
INCORPORATED
Mail to
WORCESTER, MASS.

(When Writing to Advertisers, Please Mention the Automobile Journal.)



East and West Agree

—that in the *AMERICAN SIX* Louis Chevrolet and his associates have produced a car that is distinctly uncommon and complete. At the New York and Chicago Automobile Shows the public and the trade alike endorsed the obvious sensible-ness of the *AMERICAN SIX*. They have labelled it a successful car.

Not a car merely *different*—but differently good.

A *Big* car that is comfortable but with low gasoline consumption and small tire expense.

A car of good judgment—sized right, tired right, powered right and priced right.

A car that has the sum total of things desirable in a motor vehicle—*Roadability*.

You will hear much of the Roadability of the AMERICAN SIX in the months to come.

DEALERS—If you are open for a good logical touring car to sell to the folks whose confidence you have won, find out about this car *now*.

BOSTON SHOW—Space No. 3, Main Hall. *Fred S. Smith Company.*

SPECIFICATIONS IN BRIEF

Power Plant—45 H. P. 3" x 5" motor, cast en bloc, upper half crankcase aluminum, three point suspension, water completely around each cylinder and each valve seat, helical gears, Zenith Carburetor, Gray and Davis electrical system, Willard Battery. Size of valves, 1-9/16". **Clutch**—Three dry-plate discs.

Transmission—Selective sliding gear, three speeds and reverse. **Axles**—Front, one-piece drop forged I-beam; rear, three-quarter floating, spiral bevel gears, gear ratio 4-5/12 to 1. **Springs**—Semi-elliptic; front, 38" x 2"; rear, 52" x 2"; Hotchkiss drive. **Wheelbase**—122"; **tread**, 56"; **wheels**, 32" x 4".

Equipment includes engine-driven tire pump and motometer. All dash instruments are assembled on one plate, making a driveable chassis

AMERICAN MOTORS CORPORATION

Plainfield, New Jersey, and New York

AMERICAN SIX \$1285

(When Writing to Advertisers, Please Mention the Automobile Journal.)



The Automobile Journal

New England Premier Market for Motor Cars and Accessories

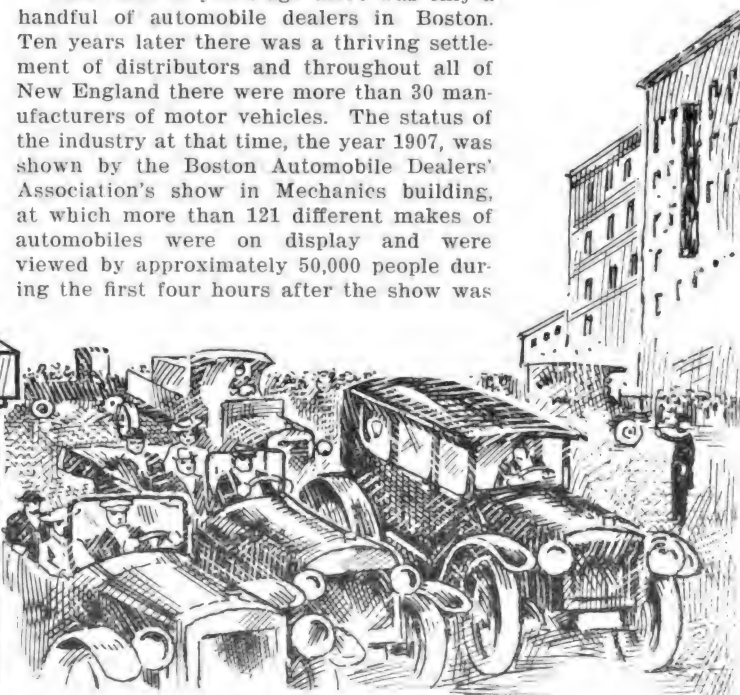
Approximately \$100,000,000 Worth of
Cars and Accessories Sold in 1916—Boston is
Hub of Wealthiest Section in United States

SINCE the very beginning of the motor car industry New England has stood pre-eminent as the greatest market for cars and accessories. In fact, the industry can be said to have had its foundations laid in New England, residents of that section having constructed, made and sold the first propelled vehicles that traversed the highways of the United States.

It is an acknowledged fact that manufacturers of American cars and business wagons do as great a volume of business through their Boston and other New England agencies and branches as they do through any of their other Metropolitan connections. In fact, there are companies, particularly those producing high grade and costly cars, which find their greatest market to be New England.

The growth of New England as the premier motor car and accessory market of the United States is reflected in the development of the large community of dealers and branches in Boston, the hub of motor car distribution of the section.

Less than 20 years ago there was only a handful of automobile dealers in Boston. Ten years later there was a thriving settlement of distributors and throughout all of New England there were more than 30 manufacturers of motor vehicles. The status of the industry at that time, the year 1907, was shown by the Boston Automobile Dealers' Association's show in Mechanics building, at which more than 121 different makes of automobiles were on display and were viewed by approximately 50,000 people during the first four hours after the show was





F. A. Hinchcliffe, Jordan Car, Treasurer Boston Dealers' Assn.



J. W. Maguire, Pierce-Arrow, Director Boston Dealers' Assn.



J. W. Bowman, Daniels Car, Director Boston Dealers' Assn.



P. S. Aultman, Kelly-Springfield, Director Boston Motor V. Assn.



E. Day Baker, Hurlburt Truck, Treasurer Boston Motor Vehicle Assn.

opened. The demand for exhibition space was so great that an overflow show was held in Horticultural Hall, which this year is again to be used for that purpose.

The dealers at that time were located on Boylston street, Park square, Columbus and Massachusetts avenues, with a scattering of garages and sales rooms on side streets. Ten more years have elapsed and a visit today to Boston's automobile district, which is now largely centred on Commonwealth avenue, will convince one that those men who invested their money and time in the belief that New England was to become one of the world's best markets for motor cars, have had their faith vindicated. Today their sales rooms stand as monuments to their success, comprising the greatest aggregation of large and beautiful buildings devoted exclusively to the sale and service for motor cars of any like place in the world.

Many millions of dollars have been in-

vested in these huge structures, and building operations during the past year have been on a greater scale than ever before in Boston. Today practically all the real estate in a section two miles long and a quarter of a mile wide is devoted to the automobile business. In fact the building movement in which the automobile men have been engaged in the past year has been one of the most notable real estate developments now in progress in Boston. There are over 20 buildings now in the course of construction or about to be begun that are to be used exclusively for the automobile trade and when completed will represent an outlay of several millions of dollars.

This most recent expansion is spreading the motor car section out from the junction of Commonwealth avenue and Beacon street into the latter street, and into Brighton and Brookline avenues.

It does not require an extensive analysis to discover why this settlement of automobile dealers enjoyed such

mushroom like growth and expanded so quickly into one of the largest distributing centres of products in New England. Just a glance at New England's status, financially and physically, its population and number of cars owned and the relation of these facts to similar ones affecting the entire country, and the secret is out. For quick comprehension these facts are arrayed together in the following table:

	United States	New England
Asses. value	\$70,789,755,451	\$7,599,586,847
Area sq. m.	3,026,789	66,426
Population.	101,882,479	6,962,109
Cars reg. (approx.)	3,000,000	300,000

Without going into the reasons why the above figures are true, we find strong support for the contention that New England is the premier motor market of the United States, if not in the world, for area covered. As shown by the above table, New England, while containing less than two per cent. of the total area of the United States, registers approximately one-tenth of all the automobiles in the country and yet has less than one-fifteenth of the total population.

The principal reason for this seeming disproportionate ownership of automobiles seems to lie in the fact of New England's wealth, which as shown by the figures is approximately one-tenth of all the United States. There are 105.7 persons per square mile in New England against 30.9 in the whole United States. The ideal market for motor cars and supplies would be naturally located in a territory where both the population and wealth is highly concentrated.

It is doubtful if conditions approaching any nearer to the ideal could be found in any other section of the world, as is shown by the statistics. It is true that there are localities which are more densely populated, but there is none where the aggregate wealth is as great in proportion to the population in a given area as that found in New England.

Aside from these statistical facts, there are a number of fundamental reasons why New England outstripped all other sections of the world in the use of the



New England Home of Marron Cars and F. E. Wing, Exclusive Distributor.

automobile, first of which is the provision of good roads. Good roads are a great stimulant to automobile sales and, besides being in large measure responsible for the ownership of so many cars, have also made New England the great summer tour ground of the country.

Within this territory are some of the best highways in the country and they are well cared for and constantly improved, with the result that there is at present a system covering over 86,718 miles of roads, of which over 18,000 miles are surfaced with modern materials. This vast system of roads connect up nearly 439 towns and cities ranging in population from 1000 to 750,000. In 1914, \$15,435,746 was spent on improving and maintaining New England's roads and in the last two years a much larger sum has been expended for this purpose. The beautiful shore resorts, mountain resorts and other localities where nature has invited the establishment of summer homes or playgrounds, being all within a comparatively short distance from the commercial and manufacturing centres of the territory, has also been a big incentive to the use of automobiles.

There are no accurate figures available as to the total of automobile business done in New England in 1916, but it is estimated at over \$100,000,000, including the sales of automobiles, accessories and supplies. At what is known as the "five-points" in Boston, at the junction of Beacon and Commonwealth avenues, and where is located the centre of distribution of motor cars in New England, the dealers located there sold over \$20,000,000 worth of cars, accessories, etc., in the past season. This volume of



John H. MacAlman, Distributor of Stearns-Knight and Boston Headquarters on Massachusetts Avenue.

business was all accomplished by dealers situated within a radius of three-quarters of a mile of that corner and does not include that of many dealers located outside of those limits and in the other larger cities of New England who deal direct between the factory and buyer.

The extent to which the business of supplying the motorists with cars and supplies in New England is indicated by the fact that there are nearly 4000 dif-

ferent firms or individuals conducting separate businesses.

Further analysis of statistics gathered by the government and the states will show that despite the enormous mill and manufacturing population that there are more individuals worth upwards of \$100,000 than in any other section of similar size in the world, possibly eliminating New York State. The lines of industry are greatly diversified, which means



Exteriors and Interiors of Prominent Boston Agencies—Upper Left, Buick Sales Rooms. Upper Right—Oakland Sales Rooms. Lower Left, White Company's Quarters. Lower Right—New Chandler Building. Centre, Garford Sales and Service Building.



Boston Branch of the Winton Company and Its Manager, F. R. Stockbridge.

a steadier form of income for the capital invested than in most any other section of the world, as in most places business is of a nature that is almost entirely or largely dependent upon the prosperity of one line or the prevalence of high prices for certain agricultural products.

From these figures it will be seen that the gain over 1914 was about 50,000 cars and that the gain in 1916, as compared with the previous year, was approximately 70,000 cars, which represents the total cars sold in the New England territory during 1916.

	Makers and Dealers	Supply Garages	Repair Shops	Dealers
Maine	186	197	56	30
N. Hampshire	493	741	207	343
Vermont	90	111	23	11
Massachusetts	493	741	207	343
Rhode Island	58	124	55	36
Connecticut	253	255	124	140
Total	1097	1594	495	582
Grand total			3768	

The reason for this great development in this business is found in the rapid increase in number of cars owned in the territory as shown by this table:

	1916	1915	1914
Maine	28,981	21,539	16,028
New Hampshire	17,508	14,915	10,596
Vermont	15,999	10,895	8,254
Massachusetts	136,809	102,633	77,246
Rhode Island	211,406	16,362	13,058
Connecticut	56,048	38,721	29,371

Totals.....276,751 205,065 154,553

As the various periods of prosperity and panic, or seasons of dullness and activity, succeed one another, the territory that enjoys an industrial complexion, such as that in New England feels the adverse turns of the business barometer far less than those who are to a considerable extent relying upon their welfare for one line of business, as either in time of war or panic all business does not suffer proportionately. Take for instance the period since the European war broke

out; New England has enjoyed the greatest period of prosperity in its history in all lines—machinery, textiles, agriculture, shoes, ammunitions, firearms, electrical equipment and tools.

It is possible that should the war suddenly terminate some of these lines might be affected, whereas others would be stimulated even beyond their present state of activity. In other sections of the country, however, a sudden termination of the European conflict would mean protracted dullness in industrial as well as agricultural lines.

New England's sole income, however, has not emanated from investments or enterprises confined to that section, but is greatly augmented by the enormous investments of its capitalists and banks in western mining enterprises. Practically all such promotions have been engineered with New England brains and capital, to say nothing of the millions of dollars that New Englanders have invested in the steadily yielding public service corporations throughout the country.

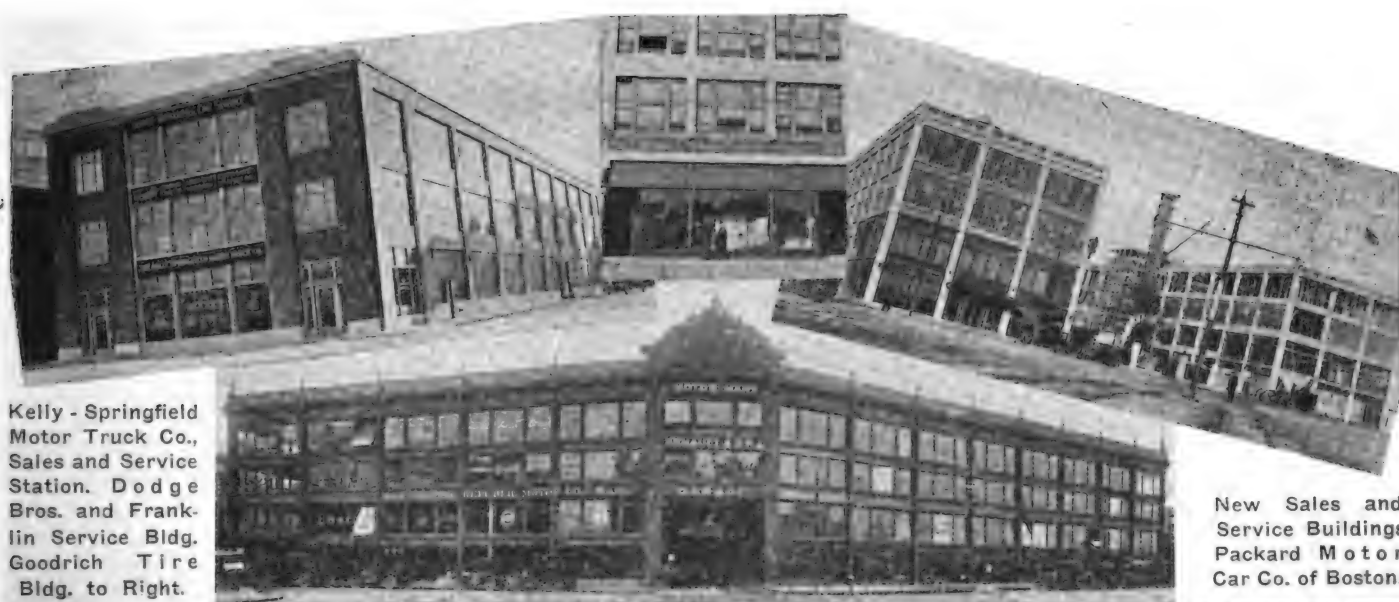
In summing up the New England situation it might be said that there is no other section of this country that is so firmly entrenched financially that it can bear the burdens of depressions with less curtailment and restriction of enterprise. Of the \$5,088,587,293 held at the close of 1916 in savings banks in the United States by 11,148,392 depositors, a



Alfred H. Sowers, Treasurer and Manager Jackson Motor Car Co., Boston.



One of the Most Beautiful Automobile Buildings in the Country, on Commonwealth Avenue, Boston, Where Jeffery, Studebaker and Chalmers Cars Are Sold.



Kelly - Springfield Motor Truck Co., Sales and Service Station. Dodge Bros. and Franklin Service Bldg. Goodrich Tire Bldg. to Right.

New Sales and Service Buildings Packard Motor Car Co. of Boston.



Boston's Famous Motor Mart in Centre, Home of Motor Car and Accessory Agencies. Locomobile Company of America's Boston Branch. Fisk Rubber Company Building. Oldsmobile Company of New England Headquarters.

total of \$1,659,708,030 was held by 3,789,827 depositors in New England. This sum is 50 per cent. more than the total monetary value of the output of the automobile industry in America for 1916, and does not include the vast sums held in trust companies, private banking institutions and postal savings banks in the New England territory.

Authentic statistics covering the annual turnover of capital in New England for a year are not available, but the Boston bank clearings form a fairly good criterion upon which to base an estimate, as that is the banking centre of the section. In 1916 the bank clearings in Boston totaled \$10,180,120,000, which sum would be easily swelled another billion with the addition of the annual clearings of the other cities in New England.

When the last Federal census was compiled it showed 25,351 manufacturing establishments in New England, with a total of 1,101,290 employees. The annual product was valued at \$2,670,065,114, of which \$1,193,768,236 represented the increased value through manufacture. The per capita valuation of the product at that time was \$480 as compared with \$225, the per capita valuation of the entire product throughout the United States. Of this value \$182 was the amount that it increased through manufacture, while for the country as a whole the added value per capita through manufacture was only \$93. New England produces over 12 per cent. of the country's manufactured products.

There is also probably a larger percentage of merchandise sold at retail and delivered by motor car in this territory than any other, owing to the fact that the main residential sections are closely built up and there are very few long hauls, less than half a day being re-

quired to go between any of the large cities. This latter fact is borne out in the extensive use of motor trucks for inter-city and suburban haulage, over 35,000 commercial vehicles being registered in the six states at the close of 1916.



Connell & McKone Co., Overland Distributors, and Peerless Motor Car Company Buildings.



Kissel Kars New England Factory Branch and C. H. McCausland, Manager.

year ending June 30, 1916:

	1916	
	Corporation	Individual
Maine	\$320,841.32	\$193,181.93
New Hampshire	103,162.65	101,777.92
Vermont	83,533.01	259,470.85
Massachusetts	2,668,189.60	4,193,828.30
Rhode Island....	416,816.44	686,626.04
Connecticut	1,275,389.68	1,446,218.16

Totals.....\$4,867,932.70 \$6,881,103.20

The total corporation and individual income tax paid to the government in 1916 from New England was \$11,749,035.90, as compared with \$124,916,315.51, the total amount paid in the United States. Here again we have another revelation of New England's wealth, having only 6.8 per cent. of the population of the country and paying 9.5 per cent. of the total received from the income tax.



Ford Motor Company's New England Headquarters and Assembly Plant and C. H. Fay, Who Recently Tendered His Resignation as General Manager After 12 Years' Service.

Of the total the majority were registered in the three southern states, Massachusetts, Connecticut and Rhode Island, 30,865 having been licensed in those states during the 12 months ending Jan. 1, 1916. Despite the extensive use of the commercial motor car by New England's industries, the field has only been scratched, as a recent survey reveals over 109,967 industries, all engaged in business of a nature that requires the employment of some means of hauling or making deliveries.

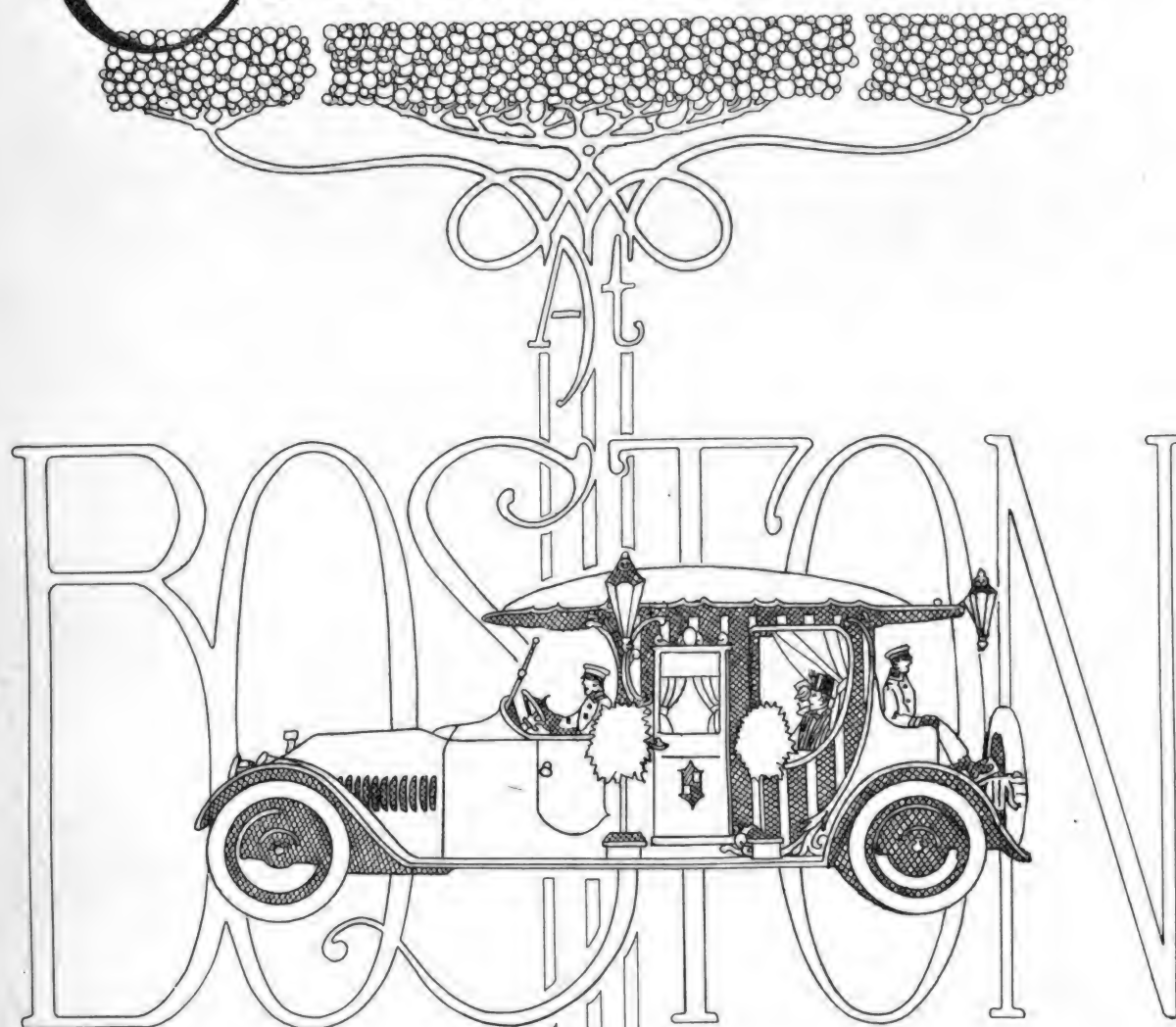
Further proof of New England's fertility as a motor car field is found in the last returns under the Federal income tax law, this section paying a per capita tax of 60 cents, while the payment throughout the country is at the per capita rate of only 41 cents. Additional evidence of the ability of New England to absorb automobiles in large quantities seems unnecessary, although as concluding evidence of a somewhat sentimental character it might be added that it is also the centre of learning and culture in the western hemisphere, the people being accustomed to having luxuries and the best and willingly make liberal expenditures for them, whether they are palatial homes, steam yachts or motor cars.

The following table gives the income tax returns from New England for the



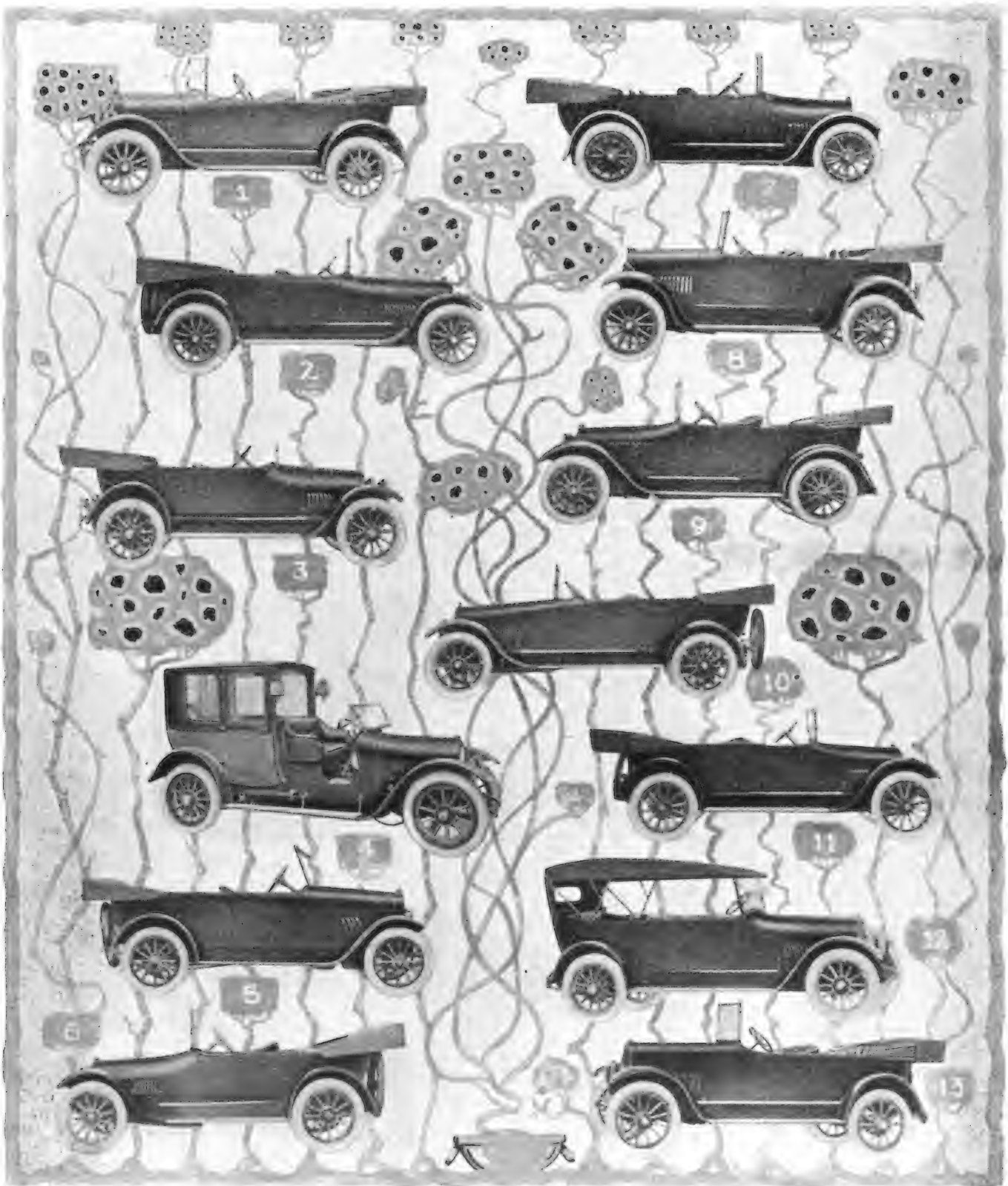
S. A. S. Strahan of Dimond & Strahan, Distributors of Crow Cars in New England, and George H. Russell of the Paterson New England Agency.

Class of 1917



Automobile Show

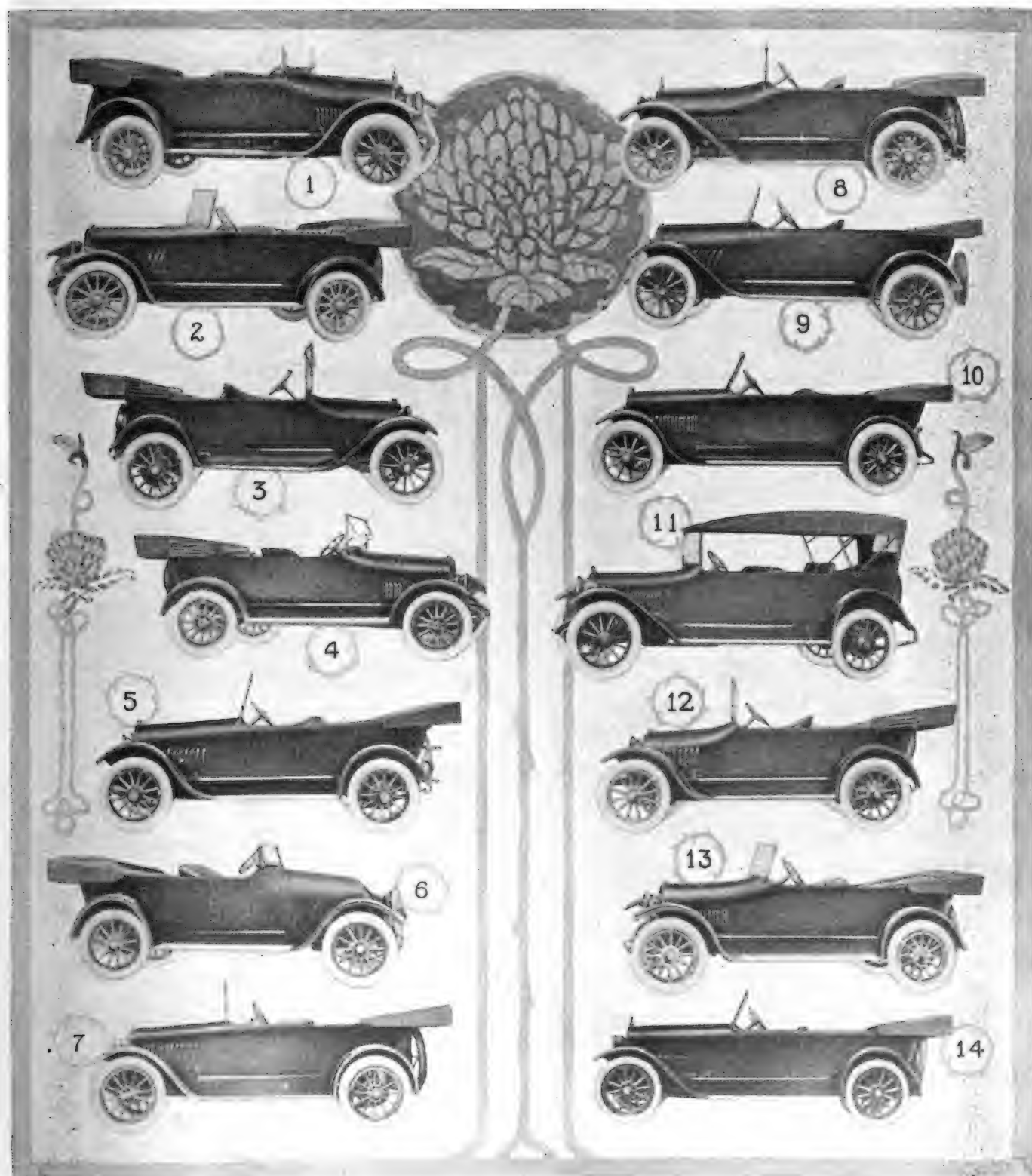
These Cars Will be Shown at Boston—



	NAME AND MODEL	CYL.	H.P.	W.B.	PRICE
(1)	Allen Classic, Touring.....	4	22.50	112	\$850
(2)	Apperson Roadplane	8	31.25	130	2000
(3)	Auburn Touring, 6-39.....	6	23.44	120	1145
(4)	Brewster Town Brougham.....	4	25.60	125	7500
(5)	Briscoe Touring, B4-24	4	16.25	105	685
(6)	Duick, D-6-45	6	25.35	115	1070
(7)	Cadillac Touring, 55.....	8	31.25	125	2000

	NAME AND MODEL	CYL.	H.P.	W.B.	PRICE
(8)	Case Touring, 40.....	4	21.03	120	1190
(9)	Chalmers Six-30 Touring.....	6	25.35	115	1090
(10)	Chandler Touring, 17.....	6	27.34	123	1395
(11)	Chevrolet Touring	8	36.45	120	1285
(12)	Cole Eight Touring.....	8	39.20	127	1695
(13)	Crow Elkhart Touring, 35.....	4	19.60	114	795

The Display Will Include All Types—



	NAME AND MODEL	CYL.	H.P.	W.B.	PRICE
(1)	Cunningham Touring, V.....	6	45.00	132	\$3750
(2)	Davis Touring, 6-H	6	25.35	119	1795
(3)	Dodge Bros. Touring.....	4	24.03	114	785
(4)	Dort Touring, 9.....	4	16.90	105	695
(5)	Empire Touring, 70.....	6	25.35	120	1235
(6)	Franklin Touring, 9.....	6	25.35	115	1950
(7)	Grant Touring, K.....	6	21.60	112	825

	NAME AND MODEL	CYL.	H.P.	W.B.	PRICE
(8)	Haynes Light Six, Touring.....	6	29.40	121	\$1485
(9)	Hollier Touring, 178.....	8	28.80	116	1185
(10)	Hudson SuperSix	6	29.40	125½	1650
(11)	Hupmobile Touring, NU.....	4	22.50	134	1340
(12)	Inter-State Touring, T.....	4	19.60	110	895
(13)	Jackson Wolverine, 349.....	8	28.80	118	1285
(14)	Jeffery Six, 671.....	6	29.40	125	1465

Touring Cars, Roadsters, and Sedans—



NAME AND MODEL	CYL.	H.P.	W.B.	PRICE
(1) King Eight Foursome.....	8	28.80	120	\$1585
(2) KisselKar, 100.6 All-Year Sedan..	6	25.35	117	1695
(3) Locomobile 38 Touring, R-7.....	6	43.25	139	4600
(4) Marion Touring, 34.....	6	33.75	136	3100
(5) Marion-Handley 6-60 Touring.....	6	23.44	120	1275

NAME AND MODEL	CYL.	H.P.	W.B.	PRICE
(6) Maxwell Touring, 25.....	4	21.03	103	\$635
(7) McFarlan Six, 127.....	6	48.60	136	3500
(8) Mercer Raceabout, 22-73.....	4	22.50	115	3250
(9) Mitchell Junior	6	25.35	120	1150
(10) Moline-Knight 50 Touring, G....	4	25.60	122	1840
(11) Monroe Touring, M-4.....	4	16.90	115	985

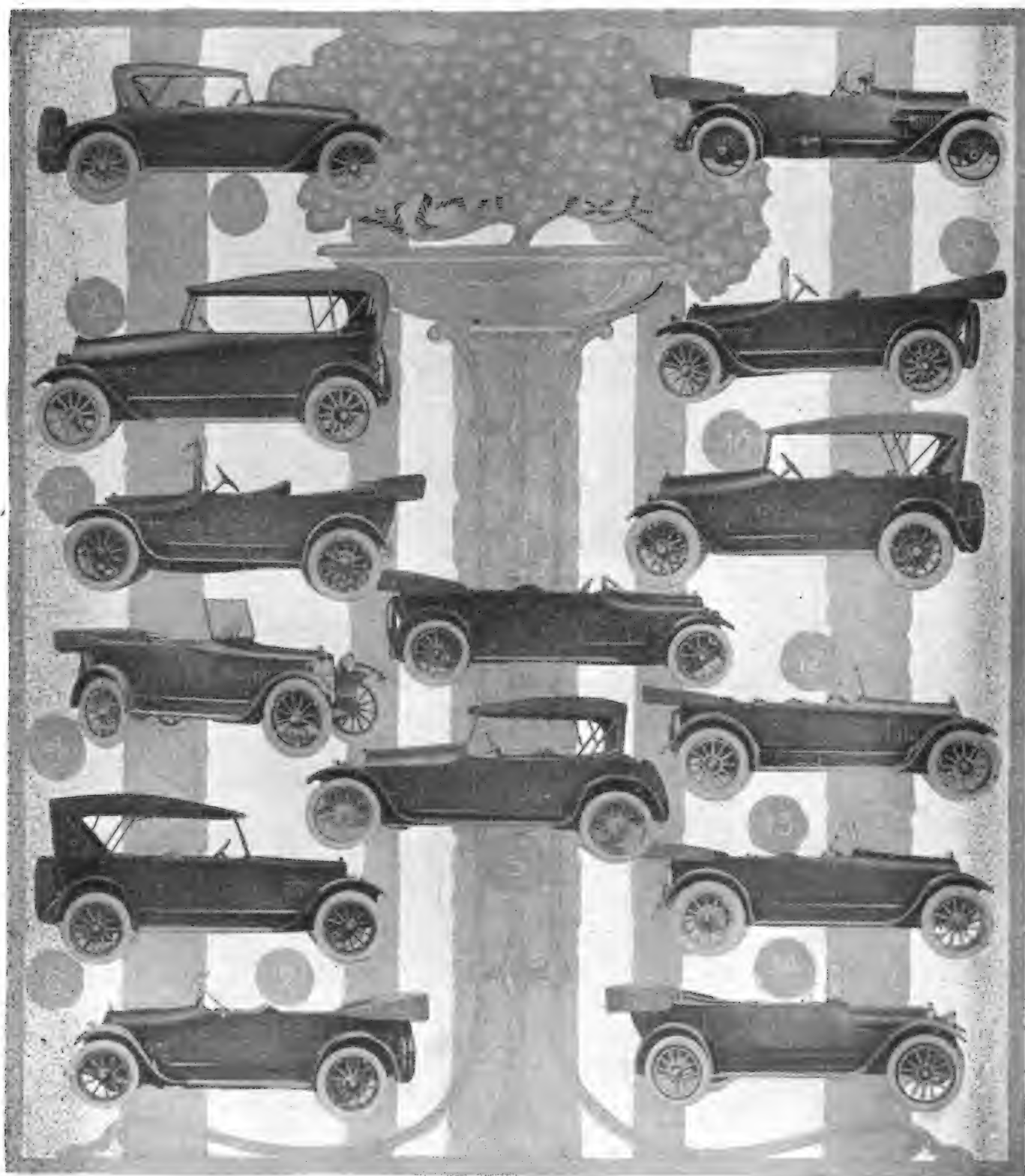
For Summer and Winter Driving—



	NAME AND MODEL	CYL.	H.P.	W.B.	PRICE
(1)	Moon, 6/43 Touring.....	6	25.35	118	\$1295
(2)	National Highway 12 Touring....	12	39.68	128	2150
(3)	Oakland Touring, 34.....	6	18.98	112	875
(4)	Oldsmobile Touring, 45.....	8	26.45	120	1367
(5)	Owen Magnetic Touring, O-36-4..	6	33.75	136	3950
(6)	Packard Standard Touring, 2-35..	12	43.20	135	3500

	NAME AND MODEL	CYL.	H.P.	W.B.	PRICE
(7)	Paige Stratford Touring.....	6	29.40	127	\$1495
(8)	Paterson Touring, 6-45.....	6	25.35	117	1095
(9)	Pathfinder La Salle Touring....	12	39.68	130	2750
(10)	Peerless Touring, 56.....	8	33.80	125	1980
(11)	Pierce-Arrow Seven Passenger, Touring, 66-A-4	6	60.00	147½	6000

Prices Ranging From \$440 to \$10,000.



	NAME AND MODEL	CYL.	H.P.	W.B.	PRICE
(1)	Premier Foursome Roadster.....	6	27.34	125½	\$1895
(2)	Pullman Touring, 424-32.....	4	22.50	114	825
(3)	Reo the Fifth, R.....	4	27.23	115	875
(4)	Saxon Touring, S4T.....	6	19.84	112	865
(5)	Scripps-Booth Cloverleaf, D.....	8	22.05	120	1175
(6)	Standard Touring, F.....	8	33.80	127	1900
(7)	Stearns-Knight Eight	8	33.80	123	2150

	NAME AND MODEL	CYL.	H.P.	W.B.	PRICE
(8)	Stutz Bulldog Special, R.....	4	36.10	130	\$2550
(9)	Studebaker Four Touring, 18....	4	24.03	112	940
(10)	Westcott Touring, 17.....	6	29.40	125	1690
(11)	White Touring, 16 valve.....	4	28.90	137½	4600
(12)	Willys-Knight Touring, 88-8.....	8	36.45	125	1950
(13)	Willys Touring, 88-Six.....	6	29.40	125	1325
(14)	Winton Six Touring, 33.....	6	33.75	128	2685

America's Most Influential Dealers Association.

Development and Importance of the Boston Automobile Dealers' Assn.—The Story of Its Shows.

FEW visitors at the great Boston Automobile Show ever give thought to the forces that make the world's greatest exhibition of motor cars possible. They are engrossed in studying the new models of vehicles and accessories, and that is as it should be—it is the purpose for which the show is staged. However, a few words about the influential and progressive organization behind the exhibition, the Boston Automobile Dealers' Association, and its other activities in the interests of motoring should be of interest at this time.



President John H. MacAlman as He Appeared in the Early Days of the Association.

It does not require much imagination on the part of a show visitor to arrive at the conclusion that an organization that can stage the world's greatest exhibition must be a very active body and intensively organized. This fact is further evident when one realizes that the Boston show is not only the oldest in this country; if not in the world, but is the biggest in point of exhibits, attendance and area covered by exhibits.

From a small exhibition of 21 makes of "horseless carriages," which were minor features of a combined motor boat and bicycle show at which 17,360 people attended in 1903, the Boston Dealers' Association has developed its annual show feature to a tremendous magnitude, displaying in 1916 more than 110 different makes of pleasure and commercial cars, not to mention hundreds of accessories, to more than 325,000 people.

This year there will be, according to reliable authorities, more than 132 makes of pleasure and commercial cars, and 170 accessory exhibitors, with a total number of models of both types of cars of approximately 512. As for attendance the show management has planned for more than 400,000 people, 150,000 of whom will come from parts of New England outside of Boston. The total value

of exhibits has been placed at \$2,000,000 and about 7000 agents, salesmen and attendants will have an active part in the show.

The Boston Show is the best known work of the Boston Automobile Dealers' Association, because of its great size and spectacular nature. However, most people do not know about the other activities of this organization, which, without doubt, is the most active and influential organization of its kind in the country.

The Boston Automobile Dealers' Association was 14 years old last January and during those 14 years it has always adhered to its original purpose for organization, "to further the interests of the automobile in and around Boston." The association was formed on Jan. 5, 1903, its first meeting being held in the office of the old American Cycle Mfg. Co. Shortly after the members, who numbered 21 and included such widely known names as John H. MacAlman, Harry Fosdick, George H. Lowe, Kenneth A. Skinner, A. P. Underhill, W. E. Eldredge and Chester I. Campbell, met for the election of officers and directors and to adopt a constitution. The officers chosen were Mr. Skinner as president, Mr. Underhill, treasurer; Mr. Eldredge, vice president, and Mr. Campbell, secretary.

The first consideration before the pioneer body was the holding of an automobile show, and 10 of the principal dealers in Boston, who were members of the association, each deposited \$100 to pay expenses, and chose the officers of



Chester I. Campbell, Secretary of Boston Dealers' Association Since Its Inception.

the association and J. H. MacAlman to constitute the first show committee. Mr. Campbell was selected as show manager, a post he has held ever since and in which he has achieved a reputation that has reached across the Atlantic to Europe.

One of the first steps taken by the association was to engage expert counsel to watch legislation effecting motoring and to fight any bills that might adversely effect car owners and dealers. It is interesting to note that at the time of the formation of the dealers' association there were 3269 car owners and 109 manufacturers and dealers registered in Mas-



The First Association Show, Held in Symphony Hall in 1903, at Which 21 Makes of Cars Were Shown to 17,360 Show Visitors.



How Exhibition Hall Was Decorated in 1916.

sachusetts. Yet there seemed to be a universal antipathy toward "horseless carriages" or else the association would never have felt itself compelled to issue a broadside against people who persisted in throwing tin cans at the pioneer cars and drivers.

Such a declaration was contained in the first show programme issued by the association, and was reprinted, with more or less ridicule, in the public press. One paragraph contained the daring prophecy that people should bear with the automobile because it was the coming vehicle for all classes of people, the author predicting that within 50 years from that date even workmen would own their cars and go to work in them. Ford had not then loomed above the automobile horizon.

Obviously it would require much space, more than is available in this issue, to do justice to the part the Boston Automobile Dealers' Association has taken in fostering motoring in New England. Its influence is felt everywhere, particularly in legislative halls when bills come up that if enacted into law prove detrimental to the progress of the industry in all its phases.

Two instances of the activities of the body that occurred within recent years will serve to indicate its scope along certain lines. Some time ago the fire department of Boston proposed an ordinance making it compulsory that every garage owner, or proprietor, install a gasoline and oil separator in his building. The garage men considered it an unnecessary expense and the dealers' association took the matter up. After several unsatisfactory conferences, fire department officials were prevailed upon to tour among the garages in cars supplied by the association to see for themselves that it was practically impossible in the ordinary course of business for gasoline and oil to pass from a garage into a sewer and form a fire hazard. The association won its point and the proposal was dropped.

At another time it was proposed to

prohibit the establishment or carrying on of a garage business within 1000 feet of a residence in Boston. Again the association took up the battle in behalf of



Two Original Members of the Association; Left to Right, A. P. Underhill and J. S. Hathaway.

all dealers in Boston, not merely its members, and showed the sponsor of the bill that serious injury would be done established garage men if the bill became law. One argument was that a garage man might start a business outside of the proscribed zone and invest considerable sums of money in the establish-

ment, only to find that some householder had bought a piece of land and erected a residence within 1000 feet of the garage, which would mean under the proposed law that the garage man would have to move, and at a considerable monetary loss.

Knowing the importance of the story of the growth and position of the Boston Automobile Dealers' Association, and believing there is a general interest in the tale of such an important organization, the Editor called upon Chester I. Campbell, secretary of the association and manager of all the automobile shows staged by the body, for his version of the association. Though exceedingly pressed for time by the multitudinous details preliminary to the opening of the show, Mr. Campbell has written the following letter:

We doubt if there has been an automobile dealers' association in this country that has stood the tests and accomplished the actual results beneficial to the trade and public as has the Boston Automobile Dealers' Association, Inc. While many of the original members have moved to other fields and become even more prominent in their work—yet the association has all the time been working away, solving the problems that have continually confronted the trade.

George H. Lowe, the one time backer of many prominent bicycle racers, and then manager of the New England branch of the White company, has still a host of friends. Known all over the country as "Pop" Lowe, he is still retained on the membership list of the association, although he has been confined to his house by illness for some six years or more.

"Pop" and "Al" Morrison were leaders in their day. Morrison is now the Pacific Coast representative of the Maxwell company. Then there was Fred Randall, whose great success in the early days with the Stevens Duryea car made him the envy of many a dealer. His death a few years ago removed a hard worker for the cause of motoring. Jim Linscott—the same Jim and still handling the Reo—and many more come to mind, but space and time will not permit further reminiscence.

Just a word about the work of the association—the hundreds of bills which are yearly placed before the Legislature gives much concern and work to the association. Many are, to say the least,



The Commercial Car Exhibition of 1912, When Trucks Were Displayed at a Special Show.

"vicious," and if allowed to become law would add very materially to the burden of the dealer and the motorist, and in many cases put the dealer out of business.

Each bill is taken separately, studied and either approved or disapproved by our counsel—our so-called "legislative representative" and the officers of the association. If in the interest of motorists it is then approved and our efforts are along the lines favoring enactment, while if against the best interests of dealers and motorists then the reverse is the case.

The annual children's outing for the blind, crippled and orphaned children is always a red letter day in the history of the association. For the past seven years a day in June has been set aside and the dealers and private owners generously provide cars, while any expense is met by the association and their friends. These outings have a country wide reputation now and they are held in several of the large cities.

The Boston Outing, however, ranks as the largest. The average attendance has been 1385 children each year, 300 automobiles and 200 attendants, making a nice little party of nearly 2000 to sit down and play in the sands of Nantasket and sup together in the big pavilion.

The president of the association, Mr. J. H. MacAlman, has been president ever since its incorporation (which took place in 1906). The same is true of the treasurer, Mr. F. Arthur Hinchcliffe, and also of the secretary, Chester I. Campbell.

The policy of the association is to look after and watch the interests of both dealers and users—not to pass drastic rules which no one can live up to, but to put its decisions in form of suggestions—and never has a member refused to listen and act.

In the last paragraph of Mr. Campbell's letter can be found the reason why the Boston Automobile Dealers' Association has a country wide reputation as being composed of the most loyal body of members of any like organization anywhere. It is one of the outstanding features of the organization, there being evident a wholesome spirit of comradeship among the 50 members now comprising the association.

The suggestions referred to are composed by the officers and directors at their monthly business meetings, generally held in the headquarters of the as-



The 1910 Exhibition in Mechanics' Hall Represented a New England Apple Orchard.



Harry Fosdick, Who Has Been a Member of the Association Since Its Organization.

sociation at 5 Park square, where Secretary Campbell has his offices and a large corps of assistants. At these meetings they take up any matter that a member may bring for attention and if the matter calls for activity on the part of the association work is begun instantly.

While not exactly related to the avowed purposes of the association, the Children's Outings have brought high commendation to the public spirited and humane members of the body. The first trip of the kind was made in 1905, when M. R. Deming of the Boston Institute Seashore Home and the Boston Dealers' Association joined in taking 28 blind children in 12 cars from the Perkins Institute for the Blind on an automobile run to the Boys' Home in Sharon.

Seven years ago the association took over the Children's Outing work itself and expanded its munificence to include children in need of such summer recreation, regardless of color, race or creed, and whether they were able bodied or crippled.

The men and companies comprising the organization are recognized as leaders in civic affairs in Boston. While they as an association do not enter much into social affairs, they can always be found ready to take part in a worthy cause. This was evident when 1200 dealers, employees and friends attended in a body a special meeting held by "Billy" Sunday during his recent campaign in Boston. When Preparedness Parades were popular throughout the country last summer and fall, the Boston dealers made up one of the largest units in the monster Boston parade and also helped defray such expense as was involved.

But as was said in the opening paragraphs, the Boston Automobile Dealers' Association is best known to the public for its great annual motor car show. Almost equally well known is the name of Mechanics' building, the place where the Boston dealers have held their shows for the past 14 years, and both the building and the association have histories that are closely identified with the development of the automobile business in New England.

Mechanics' building was the scene of the first automobile show ever held in America, three machines being displayed there in 1896 in connection with the Me-



Black and White Stripes Made a Striking Show Last Year.

chanics' Fair, at which the chief feature was the exhibition of bicycles. The second automobile show in this country was held in the same building and under the same auspices in 1898, when six cars were exhibited.

As the Mechanics' Fair was held only every other year, there was not another exhibition until 1901. From that year it has been an annual event and in each succeeding year the automobile show has grown in magnitude and importance. In 1902 the event was held under the direction of the Massachusetts Automobile Club. In 1903 the automobile dealers in Boston held the show and Chester I. Campbell managed it. The next year the Boston Automobile Dealers' Association was formed and since that time the show has been held under its auspices with Mr. Campbell as manager.

plans for the decorative scheme to be used is decided upon the problem of exhibitors comes up and after these matters have been taken care of the problem of advertising to increase the attendance has to be solved. It takes several days to install the exhibits and even after the show is opened the work has not yet been finished. There are thousands of dealers and guests that must be looked after and miscellaneous matters come up, requiring constant attention.

The expense of such an undertaking is enormous and while the gate receipts go a considerable way toward defraying the costs, the charge for exhibiting spaces furnishes the largest part of the revenue that makes the show possible.

It is no longer necessary to solicit exhibitors to use the show, most of the

ized his force after the manner of a great publicity bureau. The item of tickets alone is a big one to handle. The trade tickets are sent out and charged to the exhibitors and during the show it requires the assistance of four or five men working constantly to count and sort the tickets alone.

When the show closes it takes several days to remove the exhibits and to dismantle the decorations. After this has been accomplished there is much "closing-up" business to be handled and the rush is on for several months and does not abate until the time when the activity preceding the next show begins to develop.

The latter part of August or the first of September finds the association's office just clearing up the collections and matters incident to the March show and then notices are prepared and sent out for space allotments for the next year.

In the meantime much planning and discussion is necessary to stage the new show in settings superior to the preceding ones, otherwise it would lose prestige among the members of the trade and public. The assembling of a large number of new models is not in itself an assurance of success for the show. It must be dressed up in a new way and give the impression of an entirely different environment to maintain its popularity and retain the patronage of the public and dealers.

There is usually a force of from 2000 to 2500 men on duty in the building during a show, all of whom are attempting to maintain a high pitch of enthusiasm. Special enlivening features, such as solos, orchestral and band music and moving pictures or lectures are included in the programme to create an atmosphere of liveliness, all of which has a favorable psychological effect both upon the patrons as well as salesmen.

This method of management has steadily increased the size and business of the show, which established a world's record in 1910 for the total number of exhibits, that year 650 complete cars and chassis being shown as compared with 590 exhibited at the Olympia show in London, England, in the same year.

The history of the Boston show is best told in figures as shown in the following table covering the last 14 years:

Makes on Display.
Commer-

Year	Pleasure	cial	Totals	Attendance
1903..	21	*	21	17,360
1904..	..	..	..	30,000
1905..	..	..	..	47,000
1906..	..	..	..	52,165
1907..	115	6	121	57,213
1908..	77	7	84	69,000
1909..	88	18	106	92,000
1910..	97	25	122	107,600
1911..	102	41	143	146,363
1912..	107	66	173	225,000
1913..	108	68	176	245,000
1914..	106	35	141	245,000
1915..	71	34	105	350,000
1916..	70	39	109	325,000

*Commercial cars included in total with pleasure vehicles.



The Blind and Crippled Children Taken to Nantasket Beach in 1916 as Guests of the Boston Automobile Dealers' Association.

Each year has found a greater attendance, more exhibitors and exhibits and the actual business accomplished has steadily increased. Fifteen years ago the shows in Boston were attended by less than 20,000 people, while in the past few years over a quarter of a million have visited the Mechanics' building during show week. Actual sales of cars at the earlier shows were few and far between, while for the past few years bona fide business aggregating several million dollars has been accomplished.

The growth of the Boston Automobile Show as an institution has been gradual and consequently has attracted little attention. Few of those who attend have any idea of the amount of planning, time and labor necessary to stage the "greatest automobile show on earth," such as this exhibition is now styled.

The amount of detail requiring attention is tremendous and occupies the time of a large staff of stenographers and clerks for months prior to the week when the show is staged. After the

space being applied for months in advance of the opening. In making the allotments of space, which work is done under the direction of the Board of Directors of the Association, members, of course, are given preference and applications of exhibitors who have exhibited at the show for years are given first consideration. With some 600 odd different firms applying for space this phase of the show business in itself presents a problem that the lay man would hardly comprehend unless acquainted with it. Naturally, many set their minds on certain locations for which they have a preference, but as a space can be sold only once, much tact and diplomacy is often necessary to keep the applicant satisfied.

This work keeps a force busy most of the year, they filing applications, corresponding with applicants and sending out notices. So much detail and essential duties have arisen in connection with the show that Mr. Campbell has organ-



The Record Breaking Maxwell Non-Stop Car.

Non-Stop Test Lasts 64 Days

Maxwell Car, Equipped with Splitdorf Plugs, Covers 23,500 Miles Without Stopping Engine

After a gruelling non-stop run of 23,500 miles over roads in Maine, New Hampshire, Vermont and Massachusetts, the Maxwell stock car that performed the record feat was voluntarily brought to a halt on Jan. 25, after having been started on Nov. 22, 1916, a period of 64 days of continuous operation.

To celebrate the new non-stop record the manager of the Maxwell branch at Boston, E. F. McConaha, banqueted the drivers who handled the car in reliefs during the two months of operation. The men were J. O. Steele, J. Hunt, William Condon, H. H. Robinson, H. Blanchard and F. Londergren. In addition to these, the following also attended the dinner: Hoover L. Holton, George King, Maxwell superintendent of parts; J. C. Cate, assistant manager; W. S. Forland of the Standard Oil Co.; F. A. Frank, sales manager of the Converse Tire Co., and Robert M. Ellis, manager of the Splitdorf Electrical Co. of Boston. The last two named gentlemen were particularly interested in the test, for the car was equipped for its gruelling test with Splitdorf green jacket spark plugs and Converse tires.

In a letter addressed to Mr. Ellis, Manager McConaha took occasion to indorse the Splitdorf plugs, he saying: "No greater variety of roads or conditions could have been found for the test, and at its conclusion the Splitdorf green jacketed spark plugs were supplying the spark in the same satisfactory manner as they had been doing all through the entire run."

ELECTRIC CARS REPRESENT BIG INVESTMENTS.

At a conference held by the Electric Vehicle Section of the National Electric

Light Association, in New York City, W. P. Kennedy submitted a table of figures indicating the large investments in electric vehicles by numerous business organizations. This table, which showed that the total value of electrical equipments at the end of 1916 was \$36,000,000, was as follows:

Brewers	\$5,950,000
Department stores	5,927,000
Public service companies	4,171,000
Express and transfer companies	3,460,000
Manufacturers and merchants	2,700,000
Industrial manufacturers	1,374,000
Railroad and steamship companies (including industrial trucks)	1,200,000
Bakers	1,023,000
Packing house organizations	679,000
U. S. government service	515,000
General trucking	510,784
Wholesale dry goods	400,000
Municipal apparatus	368,000
Storage warehouse	180,000
Retail grocers	170,972
Wholesale grocers	150,000
Food products	125,220



The American Six, Designed by Louis Chevrolet, Which Will Be Seen at the Boston Salon.

Coal merchants	120,000
Hospital ambulance	120,000
Hardware	116,000
Publishers	85,787
Glass	75,000
Paper dealers	64,335
Confectioners	63,840
Restaurateurs	60,450
Musical instruments	48,687
Silversmiths	38,550
Ice	30,580
Dairy products	30,320
Clothing, retail	28,545
Silk finishers	21,525
Oriental furnishings	19,080
Soaps	17,250
Carpets	16,840
Miscellaneous applications	6,134,000

AMERICAN SIX MAKES NEW ENGLAND DEBUT.

The American Six, manufactured by the American Motors Corp., Plainfield, N. J., makes its New England debut at the Boston Automobile Show and the Automobile Salon in the Copley-Plaza Hotel in that city during the first week of March. The Americans are being displayed by Fred S. Smith, the Mercer representative, who will handle the car in Boston.

Much attention has been attracted to the American Six, which was designed by Louis Chevrolet, as it has a wheel-base of 122 inches and a large and roomy body, both the front and back seats being exceptionally spacious. It has a one-wire electric system, the fuse of which is mounted in clips on the instrument panel in the centre of the cowl. There are many other features in the American that are not incorporated in other cars in the medium priced class.

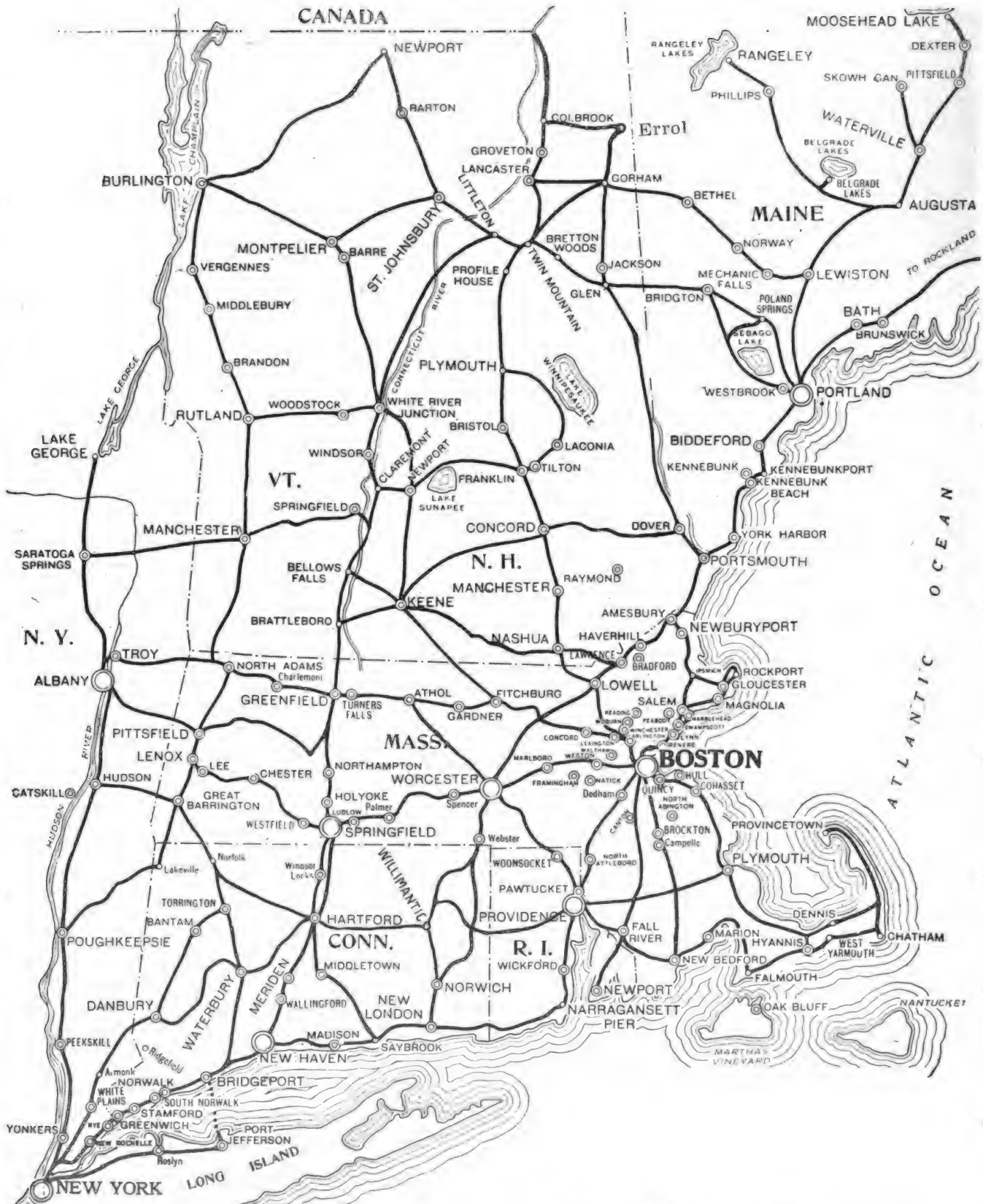
In addition to the regular standard equipment, an engine driven tire pump and motometer are included in the stock outfit that comes with the American Six.

Elgin dealers in the East are congratulating themselves on the favorable shipments they have been able to obtain, while most dealers have experienced considerable trouble in getting cars from the factories which they represent.

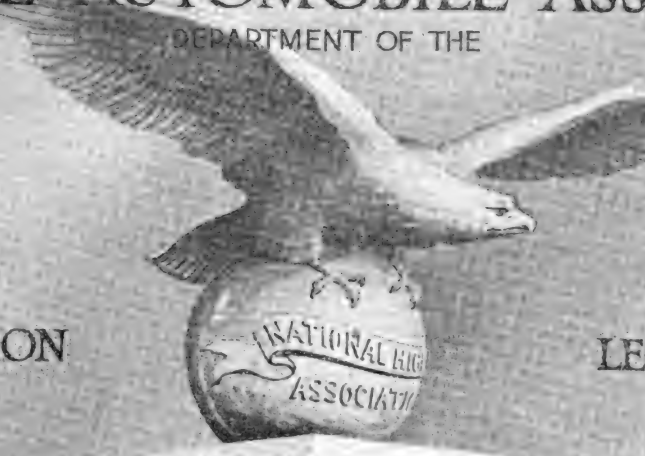
Their good fortune is due to the fact that the Elgin Motor Car Corp. is located at Chicago, Ill., where transportation facilities are practically unlimited. The factories are situated on two belt lines and adjacent to the deep water way to the gulf.

All Roads Lead to the Boston Automobile Show.

Trunk Line Routes Over Which Motorists Can Drive Their Cars from Any Part of New England to the Exhibition at Boston.



OFFICIAL JOURNAL OF THE
NATIONAL AUTOMOBILE ASSOCIATION
 DEPARTMENT OF THE



NATIONAL
 HIGHWAYS
 ASSOCIATION

TOURING
 HIGHWAY
 LEGAL DEPTS.

9 PARK STREET, BOSTON, MASSACHUSETTS

IN OUR last issue we dealt somewhat at length with prospective legislation affecting motorists, should certain bills now before various legislatures be enacted into laws. In this issue we present some decisions and discussions by the courts of various phases of existing law dealing with the legal status of motorists—their privileges, rights and liabilities, as users of the highways—which are illuminating and ought to be of interest and value to all citizens whether they own, operate or ride in motor vehicles.

Pedestrians Should Use Crossings

A WOMAN undertook to cross diagonally from the east to the west side of a street in Philadelphia, Penn. As she was approaching the west side of the street she saw an automobile approaching from the north. She then stopped at a place of safety to allow the car to pass in front of her. Had the car continued in the direction it was going at the time when the woman stopped no accident would have occurred; but when within a short distance of the woman the chauffeur turned around to speak to a passenger, the wife of the owner of the car; the automobile changed its direction, turned towards the woman, and before she could get out of the way she was run into and severely injured.

The important questions arising in this case were those relating to the car owner's negligence and the contributory negligence of the woman, and the court found for the injured woman on both questions.

But the interesting part of this case is the following instructive statement of the trial judge and its approval by the Supreme Court:

Pedestrians must use such care and caution as an ordinarily careful and prudent person would exercise under the circumstances of the case, and

more care and caution would be required of a pedestrian attempting to cross a street where automobiles and other vehicles are run between crossings, than should be exercised at a crossing; because more care is required to be exercised by the automobilist about to pass over a crossing than between crossings.

Crossings are prepared especially for pedestrians, and automobilists must bear this in mind; therefore, more care is required of a driver of a

car at crossings than between crossings.

Nevertheless, ordinary care must be observed by drivers and pedestrians at all times. Therefore, we say that more care is required of pedestrians between crossings than at crossings.

Prima Facie Speed

IN AN action in a Connecticut court for damages for death alleged to have resulted from negligence in driving an automobile at a greater rate of speed than was reasonable and proper, while passing a street car which was about to stop, it was held that while the law of Connecticut declared a speed in excess of 25 miles an hour, for a distance of one-eighth of a mile, to be prima facie, a speed that was greater than is reasonable and proper, and requires a violator to show that it was reasonable and proper, nevertheless, the law does not forbid a rate of speed in excess of 25 miles an hour, nor make such a speed conclusive evidence of negligent driving, nor make a violator an insurer against all mishaps which may arise in the course of such operation; but the prima facie evidence of unreasonable and improper speed may be overcome by proof to the contrary.

It was further held that the contributory negligence rule prevails in Connecticut, and whenever there is such a concurrent negligence that the negligence of each party is to be regarded as a proximate cause of the result of the injury, there can be no recovery. It is only when the negligence of the plaintiff is not to be regarded as proximate cause that he can recover, and then upon the ground that there is no negligence on his part contributing to produce the injury.

And the learned court added this sound comment, which is applicable to more than one class of users of the highways: "A traveler in a street on a bicycle must be watchful, make reasonable use of his senses, have reasonable control of his

Others Blow Our Horn

WE DO not seek to "blow our own horn," but it may be of interest to our members and readers generally to know what the National Automobile Association means to visitors to our offices. We have just received the following from a "Good Roads" enthusiast of Charlevoix, Mich.:

Charlevoix, Mich.

National Automobile Association,
 9 Park Street,
 Boston, Mass.

Gentlemen:—

How well and how very pleasantly I remember the day I walked into your offices seeking information, and how after getting so much of it, and so many maps, all free, that I walked out and down pretty well to Tremont street, got ashamed of myself, walked back—paid my little \$5 and became a member. And now you come back at me with your circular N. A. A. and all you do for \$5; I think it is a lot. When I go down to Boston next summer I will surely call upon you and will read now all the literature you may send."

wheel, ride at a reasonable speed and exercise ordinary care in the avoidance of known dangers and the discovery of dangers to which he may be exposed."

Care in Passing Vehicles

A MAN in Newark, N. J., was attempting to cross a street 30 feet in width. In doing so he passed between two vehicles that were standing against the curbstone. An automobile on the wrong side of the street, the operator of which sounded no horn, as it emerged from behind an approaching wagon, struck the pedestrian and injured him.

The Court of Errors and Appeals of New Jersey held that the questions of the defendant's negligence and the plaintiff's contributory negligence were for the jury to determine. It also wisely held that the traffic law required that a vehicle driver passing a vehicle ahead of him to the left does not excuse him from exercising care in ascertaining whether it can be done with safety to those on the left side of the street.

To Motor a Privilege—

Not a Right

THE operator of a motor truck in New Hampshire drove it across a sidewalk to enter a drive way leading off from the street, struck a woman and so injured her that she was immediately rendered unconscious by the collision.

The automobile laws of New Hampshire, like those of other New England states, require automobile drivers, knowing that they have injured a person, to stop, return to the scene of the accident and give name, address and such other necessary information to any proper person demanding it. The operator of the truck failed to do this. He was arrested and convicted of a violation of the statute.

Upon an appeal to the Supreme Court of New Hampshire that court held that the statute was not unconstitutional as violating the New Hampshire bill of

Lost!

LOST AND FOUND DEPARTMENT.
FREE SERVICE TO MEMBERS.

LOST. Ford touring car. Massachusetts registration No. 31,403, manufacturer's number 1,324,972. Brass bound radiator and equipped with Halliday shock absorbers, Stewart speedometer, auxiliary horn. Practically new. Suitable reward offered for information leading to recovery of car.

LOST. Robe. Dark green broadcloth, with rows of stitching about one inch from edge. Lined with small black and white checked material. Leather corners and a hook in the middle.

rights, requiring the accused to furnish evidence which might be used against him in a criminal proceeding, as the operation of an automobile is a privilege and not a right and is therefore subject to such restrictions and conditions as the Legislature may impose. And further, that the right to refuse to give incriminating evidence may be waived, and when once waived the accused is subject to be required to furnish evidence as any other person might.

It also held that even though there was no proper person present at the time of the accident to whom the operator could give his name and address, still the accident occurred upon a street where persons might be expected to pass at any moment, and that the burden was upon the accused to comply with the law.

Safe Roads for Automobiles

A RESIDENT of Maine, with his chauffeur and two small girls, was driving his automobile upon a pub-

lic highway in the town of Leeds. The automobile was being driven at about six miles an hour and just as it came upon a bridge along the way the automobile was deflected from its course by striking a plank which had been placed upon the bridge for the purpose of repairing it. The automobile was thrown against the rail, which was rotten, defective and worthless as a rail, and the automobile and its occupants were plunged into a river 12 feet below and all sustained serious injuries. Suit was brought against the town to recover for the injuries. The trial court ordered a verdict for the defendant because the automobile in which the plaintiffs were riding had not been registered as required by the laws of the State of Maine.

The Supreme Judicial Court, to which the case was appealed, held that the Legislature has the right to limit and control the use of the highways of the state whenever it is necessary to provide for and promote the safety, peace, health and general welfare of the people; and that the plaintiff, in operating his automobile under a dealer's license, from whom he had recently purchased the car, his rights upon the highways were only those of a trespasser upon the land of another, and that the town owed him no duty to keep the highway in a safe and convenient condition for him to travel on.

This decision follows the rule of law enunciated by the Massachusetts courts and also prevails elsewhere.

The opinion of the Supreme Court of Iowa impresses us as more humane and just than that of Massachusetts and Maine, when it declares, in answer to the contention that a traveler in an unregistered car is nothing more than a trespasser upon the highways, that this court is committed to the doctrine that there must be some casual connection between the act involved in the violation of the statute and the injury resulting before the violation of the statute will preclude recovery.

POLICE TRAPS--VALUABLE ADVICE FOR CAR OWNERS

IF MOTORISTS think that the trap system or police activities have ceased in New England, we would call their attention to the fact that in Boston alone 4449 persons were arrested for violation of motor vehicles laws in 1916. This is exclusive of violators of traffic and park rules. In Massachusetts, where a full record is kept of these vio-

lations and the fines paid, it appears that 9229 motorists were arrested for various offences during the year 1916 and they paid fines aggregating \$52,999.14.

One of the great departments of the National Automobile Association is the Legal Department, which is represented by attorneys in various cities in New

England, who may be consulted directly for advice or assistance for all violations of automobile laws, etc. In connection with these alleged violations, and we may add in connection also with any accident in which your motor vehicle may be involved, it would be well for you to note these essential things:

What To Do When Arrested—And What Not To Do.

- (1) Stop; think, listen; but keep your mouth shut, except to give your name and address upon request.
- (2) Remember that you are not obliged to "explain things" to arresting officer, who is usually looking for information or admissions from you to enable him to get a true story of the accident, but many of these, so-called explanations or admissions are frequently used against mo-

- torists when they are haled into court and are often much distorted. Therefore, when you are arrested for a violation of the motor vehicle laws, or are involved in an accident, keep your own counsel and consult the legal department of this association.
- (3) In any event, keep your wits about you sufficiently to enable you to examine the condition of the highway and note the traf-

fic and pedestrians upon it at the time of the alleged violation of law, or at the time of the accident. Also take any necessary measurements and the names and addresses of witnesses, as well as their observations of the circumstances involved.

Then call us up for advice or assistance. We can help you whether it is for a slight violation of the motor vehicle laws or for any other cause.



National Highways—Trunk Line Roads

The Only Roads to Good Roads Everywhere

By Charles Henry Davis, C. E.

President National Highways Association.

MR. EDITOR, you ask, "What is the development of the trunk line highway movement in the United States?" This is a very different story from that of actual construction in which, as yet, we have comparatively only just started. There never was a more general demand for anything than now exists for good roads everywhere. It takes most every variety of form and activity, from the local good roads club, in our small towns and villages, up to the great transcontinental alignments. With county, state and inter-state organizations galore, there are now many of these transcontinental highway associations, among which can be mentioned the Lincoln Highway, Meridian Road, Dixie, Jackson, Jefferson Davis, Southern Pioneer Way, Midland Trail, Pikes Peak, National Old Trails, Mississippi, etc., etc., a list too long to make complete. Many of these have heretofore been marking organizations and are only just making a beginning in gaining actual hard surfacing for their highways. Some few years ago about the only real effort toward good roads came from the many automobile clubs, led by the American Automobile Association.

These associations have always labored under the disadvantage of name and representation of a large commercial activity. There is everything in a name. Both these factors tended to set the farmer, the owner of a horse vehicle and those owning no private means of transportation, against a real good roads development. It wasn't that anyone was against what they called a good road. Not at all; everyone wanted good roads everywhere. The question was, what kind of a good road.

HARD SURFACED ROADS GOOD FOR ALL.

The value of the hard surfaced road,

which was the only kind that was a good road 365 days in the year, many did not know or appreciate until it was built at their door. The argument advanced was that a hard surfaced road was only of value to the automobilist, the rich, the tourist and long distance traveler. That they cost too much. That taxes would go up to benefit only the few. These arguments still appeal in many country communities, although much weaker than of yore.

Today the farmer rather argues, "Give us good roads from farms to town or railroad station." He is no longer prejudiced against the automobile, for he has one, and maybe a motor truck besides. He still thinks, however, that main trunk line highways are only of value to the city fellow and the tourist. As a matter of fact he is wrong, because he himself—as most of his kind—finds his farm actually located on a main trunk line.

"RADIAL ROADS" A FALLACY.

Take any road map showing all the roads in any given community. Do the roads radiate from a central point? If they do, is it not because the roads are trunk lines to other centres?

Look around you. Are not the centres of population containing nearly half (46 per cent.) of our people, all located in valleys or bottom lands? Are these centres not connected by rivers, railroads and roads along the centre lines of water sheds? Do not our great farming communities, both as to numbers and tonnage, lie along and adjacent to these centre lines of water sheds; that is, along and near river bottoms, and thus between urban centres?

Of course they do! And do not both the rural population and rural product increase in the same manner, in the same degree, and by the same laws as

all our means of communication.

The whole road system is like a tree and must be developed exactly as a tree grows. This is the way railroads, telephones, telegraphs grew. Roads must and will grow in the same manner. It cannot be otherwise. To force them to develop in any other way would be productive of all the evils that any unnatural or forced growth produces.

ROAD BOOSTERS MULTIPLY.

There are 2932 counties in the United States. There are not good roads associations in all these counties, although in some states every county has one. There are now probably 100 major good roads associations, maybe 1000 more local associations and some 500 automobile clubs, besides many chambers of commerce, commercial and trade clubs, etc., all more or less active in demanding good roads.

Of these road associations many are of the "trail" or "route" type; that is, working for a "through" road of some kind. There are 63 such in the state of Iowa alone; and there are 48 states. These are demanding the improving of certain continuous through roads extending across the state and connecting at each and with similar routes in the adjoining states.

We know of no good roads association formed to work for or to advocate radial roads. If the latter were desirable, it is likely that many organizations would exist to fight for them as against main highways. But such is not the fact. Why not?

Contrary to the cry raised by a few misguided opponents of main highway development, very few of the associations referred to have been formed at the instigation of motorists or motor manufacturers. On the other hand, they

Motor Age.
The Automobile.
The Car, London.
The Automobile, London.
The Autocar, London.
The Motor Cycle, London.
Bulletin, The Automobile Club of Philadelphia.

MAPS—AMERICAN. States.

Alabama	Maine
Arizona	Maryland
California	Massachusetts
Delaware	New York
Connecticut	New Hampshire
South Carolina	Rhode Island
Florida	Virginia
Georgia	Mexico
Ohio	North Carolina
New Jersey	Texas
Kentucky	Vermont

Highway Routes.

Atlantic Highway Map.
Lincoln Highway.
Southern National Highway.
National Old Trails Road.
Pikes Peak Ocean to Ocean Highway.
Mississippi Highway.
Great Lakes—Atlantic Highway.
Midland Trail.
Dixie Highway.
Great Plains Road.
Great Plateau Highway.
Sunshine Highway.
Pioneer Way.
International Parkway.
Jefferson-Davis Memorial.
Rocky Mountain Highway.
National Parks Transcontinental Highway.
Meridian Road.
Indian Trail.
Pacific Highway.
Great Plains Road.
Canada-Kansas City-Gulf Road.
Fifty Thousand Miles of National Highways Proposed by the National Highways Association.
Good Roads Everywhere.
National Highway and Good Roads Everywhere.

BE SURE and call at our booth, No. 509, Department F, Mechanics' Building, at the Automobile Show held in Boston, March 3-10. The booth is on the balcony floor, at the head of the stairs leading from the main floor.

Arguments for and Against National Highways.
The Motoring Camper.
The Automobile Progress.
United States Map Showing Travel Features.
One Hundred Thousand Miles of National and Transcontinental Highways.

MAPS—FOREIGN.

Environs of Paris, N. E.
Environs of Paris, N. W.
Environs of Paris, S. E.
Brittany, North.
Brittany, West.
Brittany, South.
East France, South Section.
Centre of France, East.
Centre of France, West.
French Coast.
Lyons and Savoy.
Alps, East.
Centre of France, S. E.
Centre of France, S. W.
French Mediterranean, East.
French Mediterranean, West.
French Mediterranean, Central.
France, S. W.
France, East.
France, West.
Border of Rhine, Cologne to Mayence.
Border of Rhine, Strasbourg to Constance.
Switzerland.
Italy.
Italy to Sicilian Section.
Holland.
Spain to Portugal.

Jamestown, N. Y., Jamestown Auto Dealers' Assn., at Armory..March 5-10
Fargo, N. D., Gate City Auto Show Co., at Auditorium.....March 6-9
Ft. Dodge, Ia., G. W. Tremain, Mgr., at New Terminal Warehouse..March 6-10
St. Joseph, Mo., St. Joseph Auto Show Assn., at Auditorium.....March 7-10
Trenton, N. J., Trenton Auto Trade Assn., at 2d Reg. Armory..March 14-17
Vancouver, B. C., British Columbia Automobile Assn., at Horse Show building.....March 13-16
Davenport, Ia., Tri-City Auto Trade Assn., at Coliseum.....March 14-17
Mason City, Ia., Automobile Dealers' Assn. at State Armory....March 14-17
Pittsburg, Penn., Auto Dealers Assn. of Pittsburg, at Motor Square Garden.....March 17-24
New Haven, Conn., New Haven Auto Dealers' Assn., Hotel Taft..March 19-24
Cedar Rapids, Ia., Automobile Trades Assn.....March 19-24
Deadwood, S. D., Management of J. E. Nelson.....March 27-31
Calumet, Mich., Frank Ketchell, Mgr., at Coliseum.....April ..
Stockton, Cal., San Joaquin Auto Trades Assn.....April 4-7

MOTOR TRUCK IMPORTS INTO SPAIN.

The Barcelona district of Spain is importing a gradually increasing number of motor trucks and the U. S. consul at Barcelona believes that the business could be increased if the trucks could all be entered as trucks and not pleasure vehicles. The Spanish customs regulations define a commercial truck as one that is equipped with a regulation body. The import duty under this classification is only \$3.50 per 100 pounds, while on vehicles without bodies of over 1000 kilos weight, or which have only plank bodies that can easily be converted to pleasure car purposes, the duty is \$19.30 per 100 pounds.

The specifications in the Spanish customs tariff act are not clear as to just what constitutes the two different classes, its determination being left to the customs officials viewing the goods.

RUSSIANS WILL USE TRACTORS.

A shipment of 40 American-made farm tractors recently arrived in Russia and 100 more will reach that country in April. These machines were consigned to the Russian Department of Agriculture, but will be sold to farmers on the easy payment plan. The first lot to arrive was immediately purchased by farmers who seem eager to try them out. The machines are of both heavy and light types, the large ones being rated at 60 horsepower and the smaller ones at 8 to 10 horsepower. There seems to be no demand for the medium powered machines.

The city of Cameron, Tex., plans to install a motor driven fire truck with pumping attachment in the local fire department. Tests were recently given the city officials by a manufacturer of fire apparatus.

COMING EVENTS

CONVENTIONS, ETC.

National Auto Trade Assn., meeting at Hotel Gibson, Cincinnati, O..March ..

AUTOMOBILE RACES.

Los Angeles to Salt Lake City, Road...April ..
New York, Sheepshead Bay, Speedway, Metropolitan.....May 19
Indianapolis, Ind., Championship, Speedway.....May 30
Chicago, Ill., Championship, Speedway.....June 9
Cincinnati, O., Speedway.....June 23
Omaha, Neb., Championship, Speedway.....July 4
Des Moines, Ia., Championship, Speedway.....July 14
Tacoma, Wash., Championship, Speedway.....July 28
Kansas City, Mo., Speedway.....Aug. 4
Cincinnati, O., Championship, Speedway.....Sept. 3
Providence, R. I., Championship, Speedway.....Sept. 15
New York, Sheepshead Bay Speedway, Championship.....Sept. 29
Kansas City, Mo., Speedway.....Oct. 6

Chicago, Ill., Speedway.....Oct. 13
New York, Sheepshead Bay Speedway.....Oct. 27

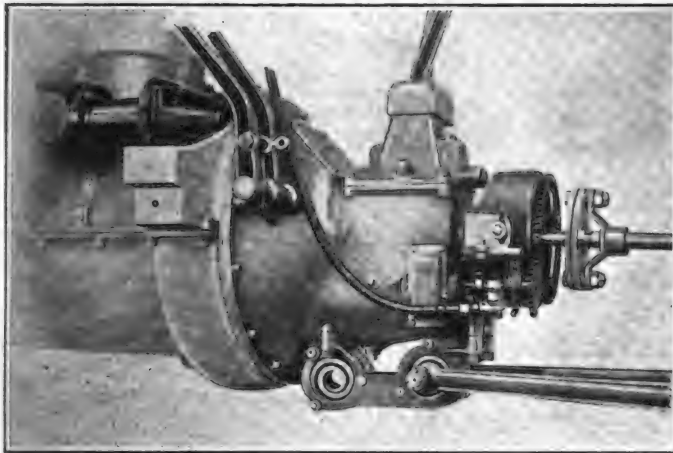
AUTOMOBILE SHOWS.

Charleston, S. C., Automobile Dealers' Assn. at Marion Square..Feb. 26-Mch. 3
Utica, N. Y., Automobile Dealers' Assn. at State Armory.....Feb. 26-March 3
Omaha, Neb., Omaha Auto Show Assn., at Auditorium.....Feb. 26-March 3
Wilkes-Barre, Penn., Auto Dealers' Assn.....Feb. 26-March 3
Atlanta, Ga., Atlanta Auto Trades and Accessory Assn., at Auditorium.....Feb. 27-March 4
St. Joseph, Mo., Auto Dealers' Assn., at Auditorium.....Feb. 28-March 3
Urbana, Ill., Automobile Trade Assn., at Armory.....March 1-3
Champaign, Ill., Champaign County Auto Dealers' Assn., University of Illinois Armory.....March 1-3
Boston, Mass., Boston Auto Dealers' Assn. and Boston Commercial Motor Vehicle Assn., at Mechanics' Bldg., Chester I. Campbell, Mgr..March 3-10
Washington, D. C., Middle Atlantic Motor Assn. at Union Bldg...March 3-10

The Hassler Shows a New Type Spring Suspension

THE Hassler Motor Co., Indianapolis, Ind., has announced their new type C roadster, which has been in process of development for the past two years. During that time it has been subjected to exhaustive tests over all kinds of roads.

The component parts employed are standard units, all of which have reputations of quality. The only unusual feature in the list is the spring suspension, the Hassler floating drive, a design new



Rear End of Power Plant, Showing Connection of Forward Ends of Radius Rods.

to the motoring public and insuring a low hung, light and powerful car.

The body is of the streamline construction, unusually large and roomy for a two-passenger roadster. The seats are staggered, the passenger being placed five inches behind the driver. The width of the two seats is 45 inches, while the distance between the front of the passenger's seat and the footboard is 32 inches.

The upholstery used is of genuine straight grain, high lustre leather. The finest grade of curled hair and the latest approved seat springs are used. The price of the new model has been set at \$1650.

A door in the rear deck gives access to a large carrying space. The running board shields are of sheet steel, and fit flush with the body, thus forming an auxiliary frame, which greatly stiffens the main frame.

The "one man" top is made of the best grade "Never Leak" top material and covered with a dust hood when not in use. The curtains and top boot are made from the same heavy grade material. The top when raised stands 41 inches above the seat cushion and does not interfere with the head when stepping into the car.

The car may be finished in either red or dark gray (gunmetal), with either white or black wheels.

The engine is a Buda, four-cylinder block, L head construction, with a bore of $3\frac{3}{4}$ inches and a stroke of $5\frac{1}{4}$ inches, which furnishes 40 horsepower at 1950 revolutions. By the S. A. E. formula it is rated at 22.50. A full aluminum crank case is used. The camshaft is driven by helical gears. The engine is lubricated by a self-contained positive feed oil pump and cooled by the thermo-siphon system through a Fedders, diamond type radiator.

The electrical system consists of three units, a Connecticut ignition system, hand control, with magneto type distributor; an Auto Lite motor with Bendix drive for starting, and an Auto Lite separate generator with a Willard six-volt, 100 ampere-hours battery.

An 18-gallon gasoline tank in the rear supplies the engine with gas through a Stewart-Warner vacuum tank and a Rayfield $1\frac{1}{4}$ inch carburetor.

The transmission forms a unit with the engine as shown in the illustration and receives the power through a Borg & Beck dry plate clutch. The gearset is a Grant-Lees, large car type, semi-steel case. S. K. F. self-aligning, double row ball bearings are used on both shafts. Shafts and gears

are made of nickel steel.

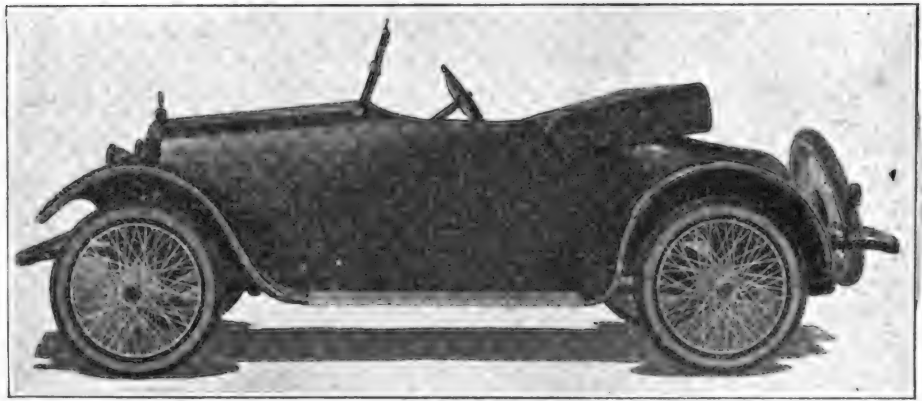
Two double Thermoid Hardy disc couplings are used as universal joints, one at the transmission end and the other at the rear axle end of the drive shaft.

The rear axle is full floating and the drive is through the radius rods, which feature insures prevention of undue strain upon the springs and the elimination of sudden jerks.

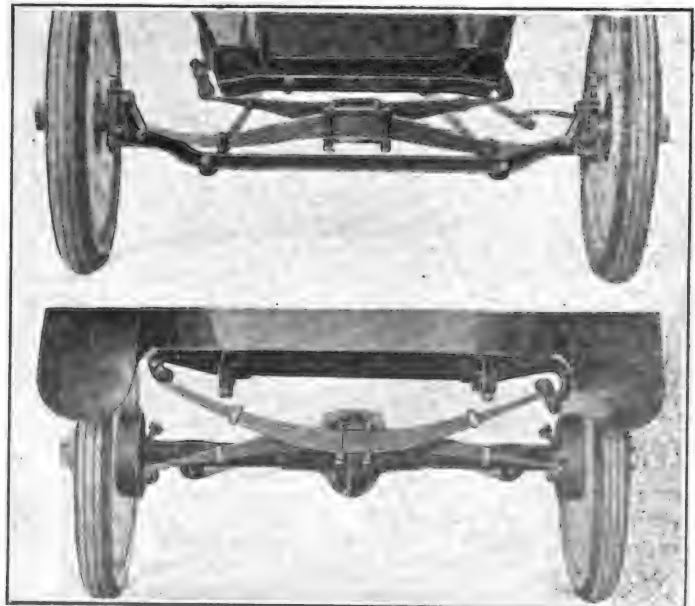
The driving gears are the well known Brown-Lipe nickel steel make and have a ratio of 37/10 to 1. The power of the engine, in relation to the weight of the car, makes this high gear ratio possible; unusual acceleration and hill climbing ability, combined with smooth running and moderate engine speeds, are obtained.

Chrome vanadium shafts running in Hyatt and New Departure bearings are used in the rear axle. The service brake, an internal expanding type, acts on 10-inch hub drums. The emergency brake, external contracting, acts on a $7\frac{1}{2}$ -inch diameter, three-inch face drum in the transmission.

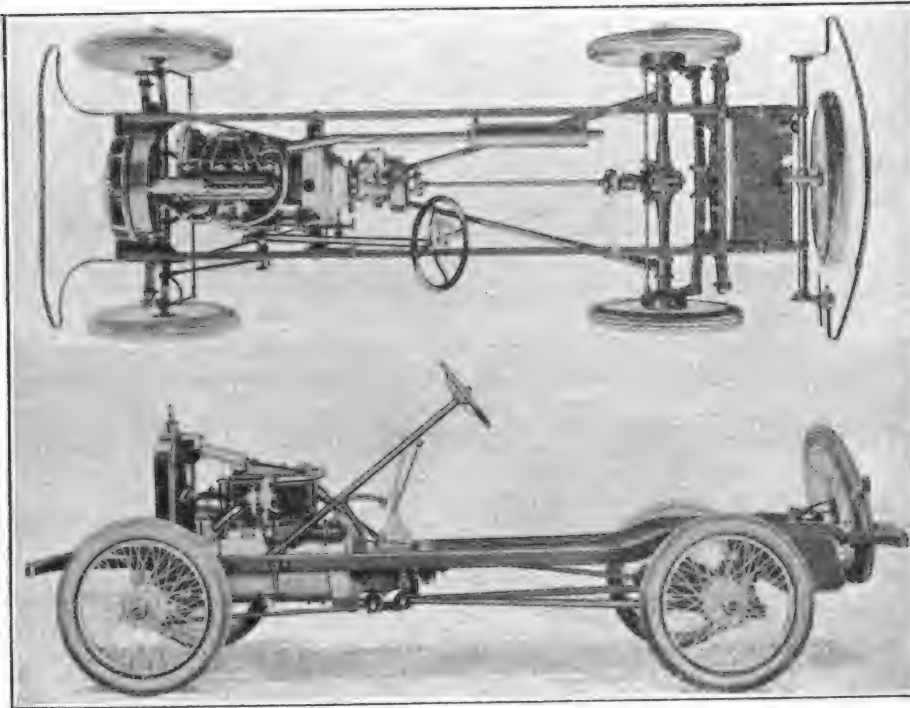
Rear axle torque is taken through two radius rods, which extend from the extremities of the rear axle to the trans-



The New Four-Cylinder Hassler Roadster Model.



How the Front Spring Assembly Appears with Radiator Shield Removed, in Top View; the Rear Spring Assembly with Tank and Tire Carrier Removed, at Bottom.



Two Views of Stripped Hassler Chassis, Showing Unusual Layout of Components.

mission case, where they are fastened to heavy Hassler volute springs, which add to the riding qualities of the leaf springs by permitting a slight resiliency in a horizontal direction to the axle.

Houk wire wheels are used in the regular equipment with Silvertown Cord, 33x4 inch straight side tires.

The spring suspension for both the front and rear is the same. In the Hassler floating drive a transverse X type spring is used, the upper member being bolted on to the back of the lower member in each case, a construction which permits a low centre of gravity and gives the car a road clearance of 10 inches with a wheelbase of 112 inches.

These springs are of different lengths and are so designed and hung that side play, tossing and throwing are neutralized and absorbed by them. This type of spring suspension, together with the volute spring arrangement for the radius rods, makes the use of accessory shock absorbers unnecessary. The radius rods from the front axle are held in the same manner as the radius rods from the rear axle, by the volute springs on the transmission case.

The steering gear, mounted on the left side, is non-reversible and an 18-inch corrugated steering wheel gives easy control. The centre control system furnishes three speeds forward and one reverse and is mounted on the transmission housing, together with the emergency brake handle.

The equipment consists of a Stewart speedometer driven from propeller shaft, motor driven electric horn, ammeter on instrument board on cowl, motometer, foot rail on right side, extra wire wheel and tire, jack and tire repair outfit, full set of tools and bumpers on front and rear of car.

The total weight of car with equipment is 2450 pounds.

NOVEL TEST OF PACK- ARD TWELVE ENGINE.

The 12-cylinder, V type Packard aero-plane engine, developed under the direction of J. G. Vincent, vice president in charge of engineering of the Packard Motor Car Co., developed over 200 horsepower on its first dynamometer test.

The engine was later mounted on a truck chassis and fitted with an aero-plane propeller. The thrust against the air was sufficient to drive the machine along at high speed and also moved it over the snow with the rear wheels locked.

"ACHIEVEMENTS" OF THE "KING EIGHT."

The King Motor Car Co., Detroit, Mich., has issued a small folder containing a brief record of the achievements of the King Eight car during the past year. The following events are recorded:

"Car owners' service test, 10,850 miles non-motor stop, Sheepshead Bay motor speedway, stock car—sanction and supervision A. A. A.

"Over tortuous Mt. Wilson on high gear in California.

"1700 miles on high gear in Northern and Southern California.

"At Hilo, Hawaiian Islands, on high gear to the volcano.

"Round the 'rim of the world' route to Big Bear lake, San Bernadino mountains, on non-boiling radiation test.

"Over Lookout Mountain, Colorado, and Lookout Mountain, California, on high gear.

"First in slow high gear race at Richmond, Va.

"Cotton Wood Canyon, from Salt Lake City to Brighton, on high gear.

"U. S. Army and U. S. Marine corps

adopt the King chassis for new type light armored motor cars after gruelling official tests.

"On high gear from Providence, R. I., to Providence, R. I., via Albany and New York City.

"Over-the-road fuel economy test, Pittsburg to Milwaukee, stock car—sanction and supervision A. A. A.

"326 hours non-motor stop run, continuously driving between Baltimore and Washington.

"Via Detroit from Providence, R. I., to Providence, R. I., on high gear.

"Los Angeles to Los Angeles via San Francisco on high gear.

"First high gear ascent up Lookout Mountain, California, by woman driver, made by Helen Gibson, in King Eight.

"Omaha to Omaha, via Kansas City, on high gear."

CLOCK WARNS MOTORISTS.

In Fall River, Mass., the big clock in the City Hall is illuminated every day at sunset to warn motorists that it is time to turn on the lights on their cars.

On a recent date when an alert policeman, having glanced at his watch, held up a passing motorist to warn him that it was lighting time and incidentally waved at the town clock. The driver, following the direction pointed, continued his bewildered stare, whereupon the policeman, scenting a mistake, gazed at the clock's face, but as it was obscured in the gloom, he had to give the why and wherefore of his strange gestures.

TAXICAB HITS POLICEMAN.

A taxicab driver in Hartford, Conn., had the misfortune to run into a policeman and then collide with another automobile. He was held on a charge of recklessly operating an automobile and expected severe treatment at the hands of the law for so rudely assaulting one of its minions. The policeman was so badly shaken up he was carried to a hospital.

COMEDY OF AUTO FIRES.

An automobile fire engine responding to an alarm in Philadelphia for a blaze in an automobile, caught fire itself and another automobile fire apparatus was called out to save it. The excitement started with a fire in the private car of a citizen, which was quickly extinguished with sand, but in the meantime some over-zealous citizen had sounded an alarm.

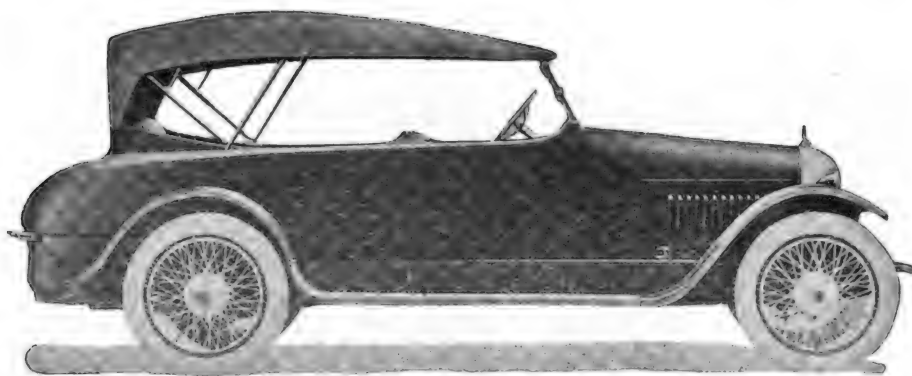
CEIBA GETS FIRST TRUCK.

An ice manufacturer in the city of Ceiba, Honduras has imported a light motor truck. This is the first commercial car ever brought to that section of Honduras. There is a heavy import duty on gasoline and the high price tends to discourage the use of motor cars, although it is believed that if the one recently brought in proves a success it will lead to other importations.

Details of the Pathfinder the Great Model

THE new 12-cylinder, seven-passenger Pathfinder touring roadster exhibited for the first time at the recent show at Grand Central Palace, New York, under the series name of The Great, was of unusual design and embodied many features new to the public. It is made by the Pathfinder Co., Indianapolis, Ind., and is priced at \$3250.

The body is long and low in effect, with graceful lines, and is so constructed



The Pathfinder the Great 12-Cylinder Touring Roadster.

The cushions are of entirely new design, special coil springs, with a second set of springs above them being used and covered by a layer of padding and finally the leather upholstery.

The unique "one-man top" when not in use is folded back into a specially designed compartment on the rear of the body. This is one of the features of this car and not only adds beauty to its general appearance, but also prevents dirt and dust from accumulating on the top when it is not in use.

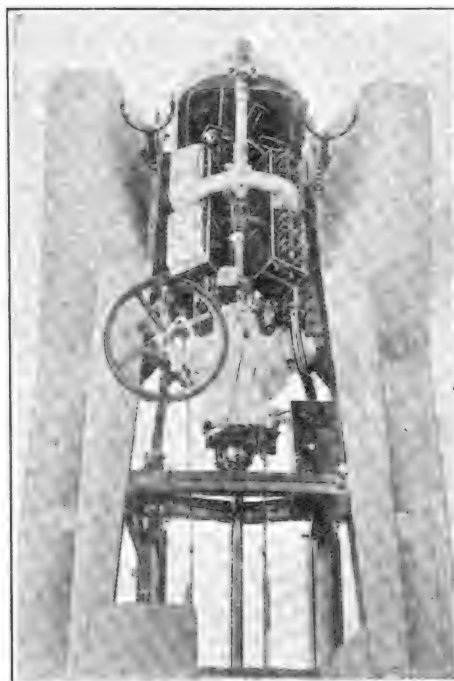
Another body feature of this model is the ingenious method of carrying extra wheels and tires. A special compartment for this purpose is located at the back of the body and is designed to carry in a horizontal position an extra wheel with its tire, and one additional tire.

The engine is V type, valve in head, 2 $\frac{7}{8}$ by five inches, A. L. A. M. rating 39 $\frac{3}{4}$ horsepower. The cylinders are cast in blocks of three, the right hand set being placed slightly ahead of the left set to permit connecting rod bearings to be side by side. The cylinder heads are cast in units of six, with intake manifold and water outlet integral for each unit. This method increases the rigidity of crank case.

The valves, located in removable head, are operated by rocker arms from a single camshaft located in the crank case and directly over the crankshaft. The push rods and rocker arms are enclosed by four cover plates, which are readily removed for adjustment.

The pistons are made of light weight semi-steel, ground and fitted with rings of the same material, and, having the same rate of expansion as the semi-steel cylinders, insure a perfect fit and tightness under all conditions.

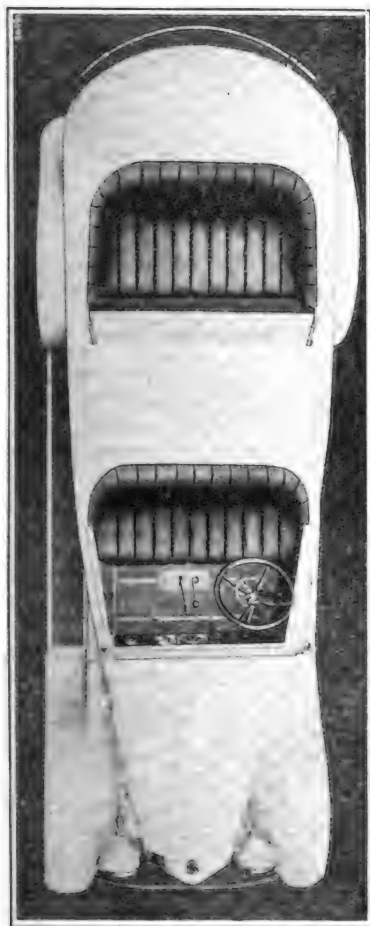
The crankshaft is of massive proportions and each throw is individually bal-



The 12-Cylinder Power Plant of the Pathfinder the Great.

anced by integrally built up metal. It is of the three-bearing type, with oil holes drilled to the connecting rod bearings, and every surface is positively fed with oil under pressure. The camshaft is driven by very wide faced helical gears with teeth cut to an angle of nearly 45 degrees to insure silence at all speeds.

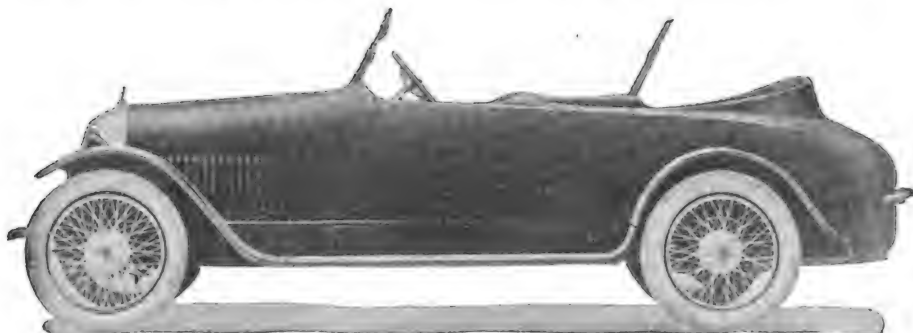
The lower half of the crank case forms an oil reservoir, which is covered with an oil strainer to prevent splashing of contents. An oil pump is located at the lowest part of the crank case and from this the oil is forced to the crankshaft main bearings and timing gears in meas-



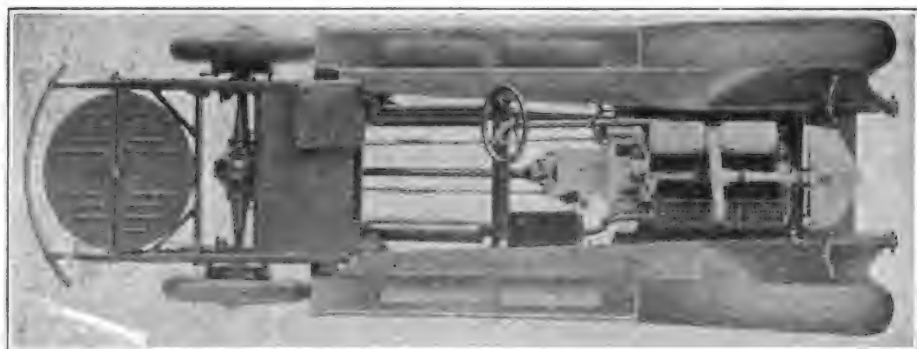
Looking Down Upon the Four-Passenger Touring Roadster.

that the front seats and cowl form one section and the tonneau, rear seats and concealed top compartment another. The auxiliary seats and floor boards are considered part of the chassis assembly and are attached directly to main cross member of frame. By these two features the body strain is evenly distributed upon the frame.

In the seating arrangement the front seat is made in two sections, with a passage way between, which gives access to the tonneau. The auxiliary seats fold forward and are hidden from view when not in use.



The Four-Passenger Touring Roadster; Note Rear Windshield.



This View of the Stripped Chassis Shows the Arrangement of the Tire Carrier.

ured proportions, and through the crankshaft itself to the connecting rods. From these parts it is thrown to pistons, cylinders, camshaft bearings and cam followers.

The radiator is of a shell and core type, V shape, and conforms to the shape of the hood. It is supported on an individual cross member, which prevents road strains and shocks being transmitted to it. The water is circulated through pipes to all cylinders by a centrifugal pump. A thermostat is located between the radiator core and the pump, which automatically maintains an even temperature in the motor, by either passing the water through the radiator or by bypassing it back of the radiator.

The gasoline tank is suspended under the cowl. It has a capacity of 18 gallons and the fuel is fed to the carburetor by gravity. A gasoline gauge shows through the instrument board in front of the driver. The filler neck is on the front side of the tank under the hood.

The latest type Stromberg carburetor is used, especially designed for 12-cylinder motors. It is adjustable by dash control and located high between the cylinders.

Cast integrally with the intake manifold is the water outlet connection from the cylinders.

The current for ignition is supplied by the generator or by the storage battery floating in the line. A single ignition timer and distributor unit contains a separate circuit breaker and distributor for each set of six cylinders. A centrifugal governor in the base of the timer housing automatically regulates the spark for normal running; a hand advance is also provided for this purpose. Separate transformer coils are provided for each cylinder block and are sealed in water tight housings.

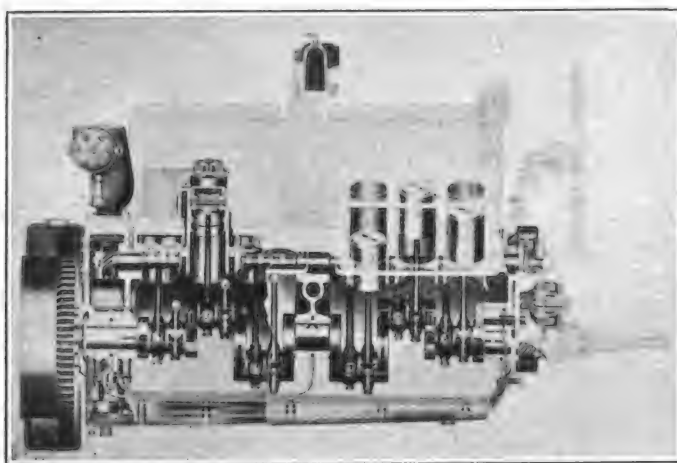
The current for lighting and for operating the starter is supplied by a generator of Delco design. A storage battery floats on the line. The starting motor is a separate unit.

The clutch is of the dry plate type and contains six asbestos fabric faced driving plates bearing against steel driven members.

The transmission is bolted to the

crank case and with the clutch and engine forms a complete unit power plant. All gears and shafts in the transmission are made of nickel steel and heat treated. Roller bearings are used throughout.

The rear axle is of the full floating type with flange drive. All gears are made of nickel steel. Bock bearings are used throughout the axle assembly. Both the service and emergency brakes are internal expanding inside a 16-inch drum.



Cutaway View of the Pathfinder 12-Cylinder Engine.

The front axle is an I beam type, drop forged and fitted with nickel steel spindles and integral spring seats. Bock annular roller bearings are used in the wheels.

The springs are made of special vanadium steel and each leaf is ground, polished and graphited before being assembled. Both the front and rear springs are of the semi-elliptic type. The torque and drive are taken on the underslung rear springs.

The car is equipped with wire wheels and Silvertown cord tires, straight sides, 35x5 inches.

A Gemmer heavy type steering gear with 18-inch corrugated solid mahogany wheel is used. A special design of the steering action tends to reduce the transmission of road shocks.

The left side drive with gear shift and emergency brake levers at the centre makes it possible for the operator to step directly to the curb without interference.

The car's equipment consists of a complete set of tools, windshield, electric horn, 75-mile speedometer with odometer for season and trip, an electric clock, a power tire pump and a motometer.

Other bodies mounted on this chassis include berline, sedan, town car, limousine, landaulet and a four-passenger roadster.

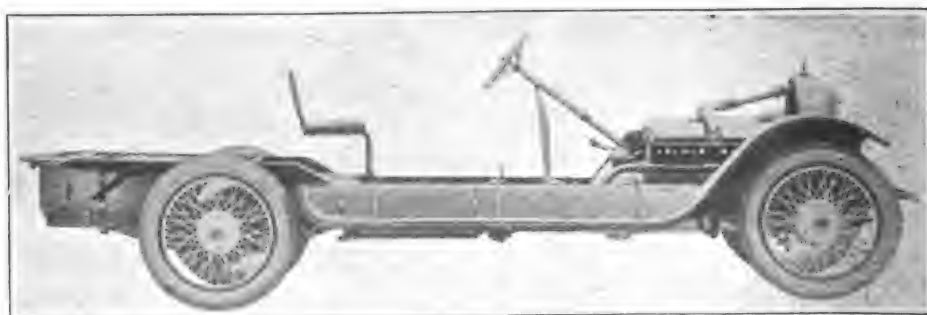
ENGLISH CAR MAKERS SEEK PROTECTION.

Although the English attitude, as judged from the cabled news, does not indicate any early prospects of peace, the manufacturers of motor cars in Great Britain have already started to discuss measures by which they can preserve and expand their business.

The commandeering of the English motor car plants by the government has permitted American manufacturers to gain a strong foothold in the British Isles, as well as in the colonies, and the fear that they will become so firmly entrenched in these markets as to cripple the British motor industry has started agitation to secure some form of tariff protection to discriminate against the imported products.

The British manufacturers are not content to depend upon the patriotic spirit of the British subjects for patronage, but favor the protective tariff as the most efficient means of barring the American product, after the war is over.

The automobile dealers of Dallas, Tex., will hold their first annual automobile show this year in connection with the Spring Style Show in the Oriental Hotel lobby. The exhibition will be under the management of Herbert Marcus.



The Pathfinder Chassis Is a Very Rugged Job.

World's Greatest Show to Be Held In Boston, Hub of World's Greatest Market for Motor Cars

THE Boston Automobile Show, held under the auspices of the Boston Automobile Dealers' Association and the Boston Commercial Motor Car Association, in Mechanics' building, Horticultural Hall

Mechanics' Building, Where 512 Cars and Hundreds of Accessories Will Be Exhibited.



and the Grand Ball Room of the Copley Plaza Hotel in that city, will be the largest and the most beautiful exhibition of its kind ever held in the world.

Opening at 2 o'clock on the afternoon of Saturday, March 3, the show will continue, excepting Sunday, until 10:30 p. m. on March 10, opening at 10 a. m. in the morning and closing at 10:30 p. m. each evening. This show is the largest in the world, as it not only occupies a greater floor area than any other, but also surpasses all that have ever been held, in point of numbers of exhibits. There will be 512 pleasure cars and trucks exhibited, including 86 different makes of pleasure cars and 46 different makes of trucks, in addition to 170 accessory exhibits. Fourteen of the pleasure cars to be shown will make their initial bow to the Boston public and 17 of the truck exhibits are to be shown in the "hub" for the first time.

Exhibits Worth \$2,000,000.

The value of this vast exhibition of motor cars and accessories is placed at \$2,000,000, and it is estimated that the total cost of staging the big show will be in excess of \$75,000. Over \$100,000 is being spent in advertising by the show management and different dealers individually and the outlay for decorations alone will reach \$45,000.

The cars that are to be shown in Boston for the first time are the American, Brewster, Biddle, Disbrow, Marion-Handley, Lexington, Napoleon, Nelson, Phianna, Puritan, Ross Eight, Liberty, Doble and Jordan. Trucks that will be seen for the first time at the Boston Show include the Atlantic Electric, At-

las, Brockway, Bethlehem, Hudford, Duplex, Four-Wheel Drive, Gramm-Bernstein, Holland Trailer, Hurlburt, Krebs, Maxim, Metropolitan, Wichita, Transport Tractor, Redden and Rush.

Boston to Have a Salon.

Boston will also have an Automobile Salon this year and for the first time, which will run during the week of the Boston Automobile Show, at the Copley-Plaza Hotel, and will be under the management of Chester I. Campbell. The Salon will be run separately from the main shows at Mechanics' Building and Horticultural Hall, an extra admission fee being charged. Most of the exhibitors at the Salon will also show their products in Mechanics' building.

This extensive showing of automobiles necessarily will bring together in Boston one of the largest gatherings of people ever witnessed in New England. The number of dealers, salesmen and attendants who will take an active part will exceed 7000, while an attendance of the public numbering over 400,000 is estimated, including over 150,000 from all parts of New England outside of Boston. A conservative estimate places the amount of business resulting from the great exhibition at approximately \$6,000,000, of which sum \$4,000,000 will be spent for cars at the show by motorists and dealers and \$2,000,000 will be spent by visitors and others at the hotels, theatres and in shopping.

Elaborate Decorations.

The decorations, which were designed by Ernest W. Campbell of the Boston Architectural Club, are on a more elaborate scale than ever before attempted for

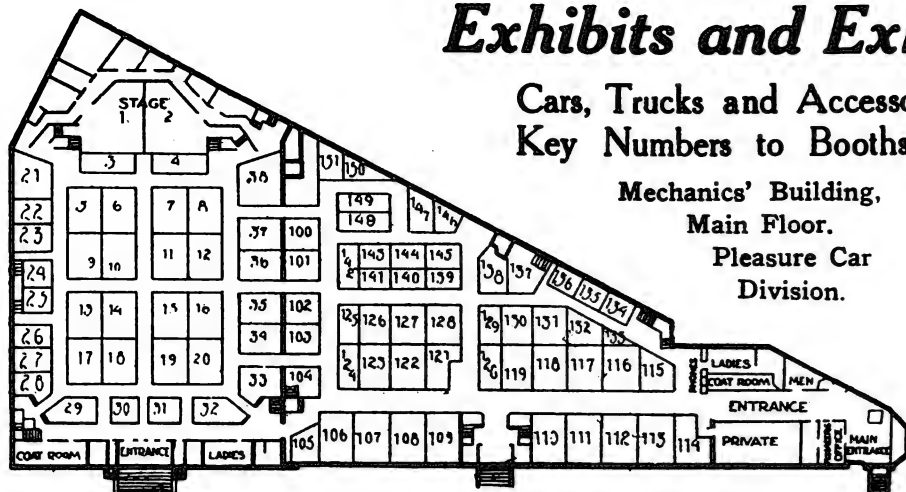
a similar exhibition. An enormous amount of material was necessary to carry out the scheme, the extent of which may be gained from the following list: Draperies, 20,000 yards; scenery, 80,000 square feet; lumber and building material, 60,000 square feet; floor coverings, 18,000 square yards; electric lights, 8000; artificial flowers, shrubbery and hedges, five tons. During the week prior to the opening 500 men were employed in the task of setting this scenery and preparing the halls for the exhibits, and over 200 men were laboring steadily for two months in advance to make and arrange the necessary paraphernalia for such a gigantic task of scenic creation.

Six Orchestras Engaged.

Mr. Campbell has not depended solely, however, upon the magnificent decorative scheme to carry the impression and create the environment of the greatest automobile show on earth, but has arranged a musical programme which will also distinguish the exhibition as one of the liveliest ever held. There will be six orchestras, including the Boston Philharmonic Orchestra, led by Louis Beserer, which will play in the Grand Exhibition Hall. In the smaller exhibition hall, the Bostonian Ladies' Orchestra, led by Belle Yeaton Renfrew, will render a programme of snappy music, and Florence Fletcher will lead another ladies orchestra in the basement. Ruth Stickney will preside over the musical programme in Paul Revere Hall with her famous trio. Edna Frances Simmons will provide the musical numbers at the Salon in the Copley-Plaza, and in Horticultural Hall Adele Ninenger will direct the musicale.

Exhibits and Exhibitors at Boston

Cars, Trucks and Accessories To Be Displayed, with
Key Numbers to Booths—Prices f. o. b. Boston,

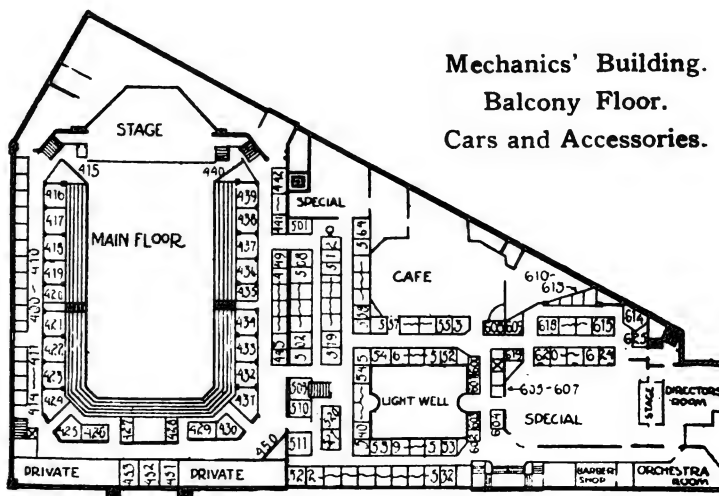
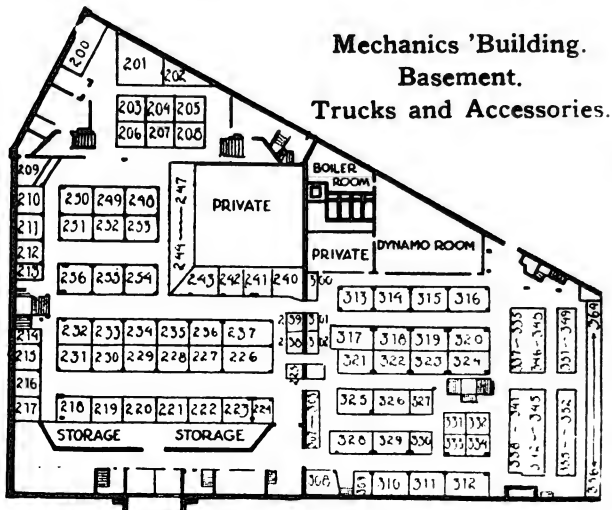


Cars and Exhibitors in Mechanics Building

Allen, John L. Judd, Boston—427-8.
Five-passenger touring, \$850.
Four passenger chummy roadster, \$875.
Two-passenger roadster, \$850.
American Six, Fred S. Smith Co., Boston—3.
Five-passenger touring, 6 cyl., \$1285.
Apperson, Shauck & MacMurray Co., Boston—134-5a.
Four-pas. chummy road., 6 cyl., \$1805.
Auburn, John L. Judd, Boston—427-8.
Seven-passenger touring, 6 cyl., \$1535.
Five-passenger touring, 6 cyl., \$1145.
Four-pas. chummy road, 6 cyl., \$1145.
Biddle, Geo. W. Canterbury, Inc., Boston—24-5.
Five-passenger town car, 4 cyl., \$4000.
Four-passenger touring, 4 cyl., \$2500.
Briscoe, Charles Motor Co. of N. E., Boston—111a-2.
Five-passenger touring, 4 cyl., \$685.
Four-pas. chummy road., 4 cyl., \$685.
Five-passenger coachair, 4 cyl., \$810.
Five-passenger touring, 8 cyl., \$845.
Five-passenger touring, 8 cyl., \$1045.
Buick, Buick Boston Co., Boston—140-1-2-3-4.
Two-passenger roadster, 4 cyl., \$660.
Five-passenger touring, 4 cyl., \$675.
Two-passenger roadster, 6 cyl., \$1040.
Five-passenger touring, 6 cyl., \$1070.
Three-passenger coupe, 6 cyl., \$1440.
Seven-passenger sedan, 6 cyl., \$1835.
Seven-passenger touring, 6 cyl., \$1385.
Cadillac, Cadillac Automobile Co. of Boston, Boston—2.
Seven-passenger touring, 8 cyl., \$2240.
Four-passenger phaeton, 8 cyl., \$2240.
Four-pas. club roadster, 8 cyl., \$2240.
Four-pas. Victoria, conv., 8 cyl., \$2710.
Seven-pas. conv. touring, 8 cyl., \$2835.
Seven-pas. Imperial lim., 8 cyl., \$3910.
Cass (349-51), Eastern Motor Sales Co.,

Boston—349-51.
Seven-passenger touring, 4 cyl., \$1190.
Two-passenger tourabout, 4 cyl., \$1190.
Chalmers, Chalmers Motor Co. of N. E., Boston—108-9.
Five-passenger touring, 6 cyl., \$1250.
Two-passenger roadster, 6 cyl., \$1250.
Seven-passenger touring, 6 cyl., \$1350.
Seven-passenger touring, 6 cyl., \$1950.
Seven-passenger sedan, 6 cyl., \$1850.
Seven-passenger limousine, 6 cyl., \$2550.
Seven-passenger town, 6 cyl., \$2550.
Chassis, \$1200.
Chandler, Chandler Motors of N. E., Boston—123-4.
Seven-passenger touring, 6 cyl., \$1395.
Four-passenger roadster, 6 cyl., \$1395.
Four-pas. convert. coupe, 6 cyl., \$1995.
Chassis, 6 cyl.
Chevrolet, Chevrolet Motor Co. of N. E., Boston—121a-2.
Two-passenger roadster, 4 cyl., \$535.
Five-passenger touring, 4 cyl., \$550.
Five-passenger touring, 4 cyl., \$800.
Two-passenger roadster, 4 cyl., \$800.
Five-passenger touring, 4 cyl., \$1385.
Four-pas. chummy roadster, 4 cyl., \$1385.
Cole, B. G. Smith & Sons Co., Boston—36-7.
Crow-Elkhart, Crow Motor Car Co. of N. E., Boston—480.
Three-pas. clover leaf road., 4 cyl., \$860.
Cunningham, Cunningham Son & Co., Boston—137-813-4.
Seven-passenger touring, 8 cyl., \$3750.
Chassis.
Daniels, J. W. Bowman Co., Boston—5 and 9.
Two-passenger roadster, 8 cyl., \$2850.
Four-passenger touring, 8 cyl., \$2850.
Seven-passenger touring, 8 cyl., \$2850.
Seven-pas. limousine, 8 cyl., \$4300-\$4500.
Davis, J. W. Bowman Co., Boston—5 and 9.
Five-passenger touring, 6 cyl., \$1195.
Five-passenger touring, 6 cyl., \$1195.
Seven-passenger touring, 6 cyl., \$1795.
Detroit Electric, E. Y. Stimpson, Boston—135a-6.

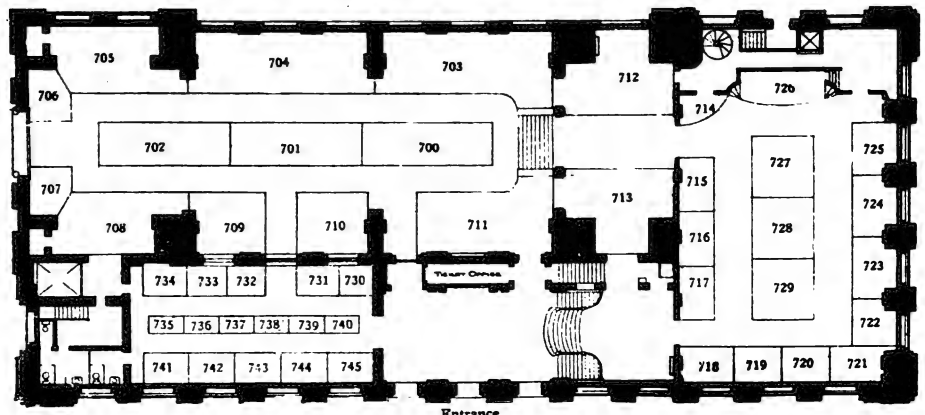
Four-passenger coupe, \$1825.
Five-pas. Detroit electric b'ham, \$2425.
Doble, General Engineering Co., Detroit, Mich.—429.
Dodge Bros. Car, Henshaw Motor Co., Boston—100-1.
Five-passenger touring, 4 cyl., \$785.
Two-passenger roadster, 4 cyl., \$785.
Five-passenger sedan, 4 cyl., \$1185.
Chassis.
Dort, Dort Motor Car Co., Flint, Mich.—Dept. G.
Five-passenger touring, 4 cyl., \$695.
Three-passenger roadster, 4 cyl., \$695.
Five-passenger sedan, 4 cyl., \$815.
Five-passenger sedan, 4 cyl., \$1065.
Empire, Dutton Motor Co., West Somerville, Mass.—138.
Seven-passenger touring, 6 cyl., \$1265.
Four-passenger tourabout, \$1145.
Two-passenger speedster, 4 cyl., \$1165.
FIAT, FIAT Motor Sales Co., Boston—113-4.
Chassis, 4 cyl., \$5000.
Seven-passenger touring, 4 cyl., \$5500.
Seven-pas. lim. brougham, 4 cyl., \$6500.
Seven-passenger touring, 4 cyl., \$5500.
Ford, Ford Motor Co., Cambridge, Mass.—117-8 and 318.
Five-passenger touring, 4 cyl., \$360.
Two-passenger runabout, 4 cyl., \$345.
Two-passenger coupelet, 4 cyl., \$505.
Five-passenger sedan, 4 cyl., \$645.
Six-passenger town car, 4 cyl., \$595.
Franklin, Franklin Motor Car Co., Boston—121b-127a-128.
Five-passenger touring, 6 cyl., \$1975.
Two-passenger roadster, 6 cyl., \$1925.
Four-passenger roadster, 6 cyl., \$1975.
Five-passenger sedan, 6 cyl., \$2875.
Seven-passenger town car, 6 cyl., \$3125.
Grant, H. S. Waite Co., Boston—416-7.
Haynes, W. L. Russell Co., Boston—28.
Five-passenger touring, 6 cyl., \$1645.
Seven-passenger touring, 6 cyl., \$1645.
Four-passenger touring, 6 cyl., \$1645.
Seven-passenger touring, 12 cyl., \$2275.
Hollier, Hollier Motor Sales Co., Boston—423-4.
Five-passenger touring, 8 cyl., \$1225.
Four-passenger roadster, 8 cyl., \$1225.
Five-passenger touring, 6 cyl., \$935.
Hudson, Henley-Kimball Co., Boston—125-6-7b.
Seven-passenger touring, 6 cyl., \$1725.
Seven-passenger limousine, 6 cyl., \$3000.
Seven-passenger sedan, 6 cyl., \$2250.
Three-passenger cabriolet, 6 cyl., \$2025.
Four-passenger phaeton, 6 cyl., \$1825.
Hupmobile, Atlantic Auto Co., Boston—147.
Five-passenger touring, 4 cyl., \$1230.
Two-passenger roadster, 4 cyl., \$1230.
Inter-State, Inter-State Boston Co., Boston—310.
Four-passenger roadster, 4 cyl., \$950.





Horticultural Hall, Which Takes Overflow of Pleasure Cars. Trucks and Accessories from Mechanics Building.

- Five-passenger touring, 4 cyl., \$925.
Four-passenger roadster, 4 cyl., \$950.
Jackson, Jackson Motor Car Co., Boston—35.
Four-passenger cruiser, 8 cyl., \$1335.
Seven-pas. Wolverine sedan, 8 cyl., \$2025.
Five-passenger touring, 8 cyl., \$1090.
Jeffery, C. P. Rockwell, Inc., Boston—105-6-7.
Jordan, Hinchcliffe Motor Co., Boston—110-1b.
Two-passenger runabout, 6 cyl.
Four-passenger touring, 6 cyl.
Seven-passenger touring, 6 cyl., \$1695.
King, King Motors, Inc., Boston—426.
Three-passenger roadster, 8 cyl., \$1630.
Four-passenger foursome, 8 cyl., \$1630.
Seven-passenger touring, 8 cyl., \$1630.
Seven-passenger sedan, 8 cyl., \$2195.
Kissel, Kissel Kar, N. E. Branch, Boston—34 and 104.
Five or seven-pas. sedan, 6 cyl., \$1685.
Five or seven-pas. touring, 6 cyl., \$1335.
Four-passenger coupe, 6 cyl., \$1685.
Four-pas. all-year road., 6 cyl., \$1335.
Lenox, Lenox Motor Car Co., Boston—151.
Seven-passenger touring, 6 cyl., \$2650.
Three-passenger roadster, 6 cyl., \$2650.
Marmion, Frank E. Wing, Boston—8 and 12.
Seven-passenger touring, 6 cyl., \$3650.
Seven-passenger limousine, 6 cyl., \$4600.
Four-pas. club roadster, 6 cyl., \$3650.
Three-pas. club roadster, 6 cyl., \$3650.
Chassis, \$2800.
Maxwell, Maxwell Motor Sales Corp., Boston—132-3.
Two-passenger roadster, 4 cyl., \$655.
Five-passenger touring, 4 cyl., \$670.
Five-passenger sedan, 4 cyl., \$1020.
Chassis, \$580.
McFarlan Six, Anthony-Phillip Co., Brighton, Mass.—150.
Seven-pas. touring, 6 cyl., \$3500-\$3700.
Seven-pas. limousine, 6 cyl., \$4650-\$4850.
Mercer, Fred S. Smith Co., Boston—3.
Four-passenger touring, 4 cyl., \$3500.
Metz, Metz Co., Waltham, Mass.—609 to 625.
Milburn Electric, E. Y. Stimpson, Boston—135a-136.
Mitchell, Pope-Hartford Co. of Boston, Boston—Paul Revere Hall.
Seven-passenger sedan, 6 cyl., \$2225.
Five-passenger touring, 6 cyl., \$1200.
Seven-passenger limousine, 6 cyl., \$2835.
Five-passenger town, 6 cyl., \$2825.
Five-passenger club road., 6 cyl., \$1545.
Seven-passenger touring, 6 cyl., \$1510.
Three-passenger roadster, 6 cyl., \$1175.
Chassis, 6 cyl., \$1275.
National, A. T. Hart Co., Boston—26-7-8.
Four-passenger roadster, 6 cyl., \$1800.
Seven-passenger touring, \$1800.
Seven-passenger limousine, \$3200.
Four-passenger phaeton, 12 cyl., \$2200.
Seven-passenger touring, 12 cyl., \$2200.
Oakland, Oakland Motor Co. of N. E., Boston—148-9 and 220.
Four-passenger roadster, 8 cyl., \$2040.
Two-pas. speeding road., 8 cyl., \$2310.
Six-passenger sedan, 8 cyl., \$2900.
Four-passenger coupe, 8 cyl., \$2760.
Seven-passenger limousine, 8 cyl., \$3410.
Phianna, Alfred Cutler Morse & Co., Boston—102-3.
Pierce-Arrow, J. W. Maguire Co., Boston—16 and 20.
Seven-pas. flat roof sub., 6 cyl., \$6800.
Seven-pas. sub-landau, 6 cyl., \$6800.
Five-passenger touring, 6 cyl., \$5400.
Seven-passenger touring, 6 cyl., \$5500.
Four-passenger runabout, 6 cyl., \$5400.
Seven-passenger flat roof brougham-landaulet, 6 cyl., \$5900.
Seven-pas. flat roof b'ham, 6 cyl., \$5900.
Five-passenger touring, 6 cyl., \$4800.
Four-passenger touring, 6 cyl., \$4800.
Premier, Frank L. Brown, Inc., Boston—146.
Seven-passenger touring, \$1895.
Four-passenger touring, \$1895.
Reo, Linscott Motor Co., Boston—119-20.
Seven-passenger touring, 6 cyl., \$1310.
Four-passenger roadster, 6 cyl., \$1310.
Five-passenger touring, 4 cyl., \$925.
Three-passenger roadster, 4 cyl., \$925.
Seven-passenger sedan, 6 cyl., \$1800.
Roamer, Alfred Cutler Morse & Co., Boston—102-3.
Five-pas. skiff body, 6 cyl., \$1850.
Four-passenger sedan, 6 cyl., \$2650.
Five-passenger touring, 6 cyl., \$2950.
...-passenger town car, 4 cyl., \$6000.
Chassis, \$3600.
Ross Eight, Bishop Motor Sales Co., Boston—354.
Saxon, Hawley-Cowan Co., Boston—1aa-2bb and 29.
Five-passenger touring, \$865.
Five-passenger sedan, \$1250.
Four-passenger chummy roadster, \$865.
Four-passenger roadster, \$495.
Scripps-Booth, Scripps-Booth Motor Car Co., Boston—30-1.
Two-passenger coupe, 4 cyl., \$1485.
Two-passenger roadster, 4 cyl., \$970.
Four-passenger roadster, 8 cyl., \$1335.
Simplex, Geo. W. Canterbury, Inc., Boston—24-5.
Three-passenger roadster, 6 cyl., \$7800.
Stanley, Stanley Motor Carriage Co., Newton, Mass.—21.
Five-passenger touring, 2 cyl., \$2200.
Seven-passenger touring, 2 cyl., \$2300.
Chassis, 2 cyl.
Stearns-Knight, J. H. MacAlman, Boston—15 and 19.
Seven-passenger touring, 8 cyl., \$2300.
Seven-passenger limousine, 8 cyl., \$3550.
Four-passenger coupe, 8 cyl., \$2950.
Five-passenger touring, 4 cyl., \$1550.
Four-passenger cloverleaf, 4 cyl., \$1550.
Seven-passenger landaulet, 4 cyl., \$3050.
Studebaker, Donovan Motor Car Co., Boston—115-6.
One "Gold car." Not for sale.
Seven-passenger touring, 6 cyl., \$1230.
Two-passenger roadster, 6 cyl., \$1220.
Seven-passenger touring, 4 cyl., \$985.
Five-pas. special phaeton, 6 cyl., \$1625.
Two-passenger roadster, 4 cyl., \$975.
Stutz, Becker-Stutz Auto Co., Boston—4 and 418.
Westcott, Bishop Motor Sales Co., Boston—354.
White, The White Co., Boston—7 and 11.
Seven-passenger touring, 4 cyl., \$4640.



Floor Plan of Horticultural Hall—Cars, Trucks and Accessories.



Copley Plaza Hotel, Where the Boston Salon Will Be Held in Grand Ball Room.

Four-passenger town car, 4 cyl., \$5690.
 Four-passenger roadster, 4 cyl., \$4640.
 Three-passenger coupe, 4 cyl., \$5690.
 Four-passenger sedan, 4 cyl., \$5690.
 Seven-passenger landaulet, 4 cyl., \$5240.
Willis-Knight, Connell & McKone Co., Boston—129-30-1.
 Seven-pas. touring sedan, 4 cyl., \$1950.
Winton, The Winton Co., Boston—6 and 10.
 Seven-passenger touring, 6 cyl., \$2735.
 Seven-passenger limousine, 6 cyl., \$3650.
 Four-pas. cloverleaf road., 6 cyl., \$2685.
 Three-passenger coupe, 6 cyl., \$3600.
 Seven passenger touring, 6 cyl., \$3500.
 Seven-passenger limousine, 6 cyl., \$4500.

Cars and Exhibitors

in Horticultural Hall

Marion-Handley, Anthony-Pilling Co., Brighton, Mass.—703.
Moline-Knight, Moline-Knight Sales Co., Boston—715-6-7.
 Five-passenger touring, 4 cyl., \$1900.
 Seven-passenger touring, 4 cyl., \$2500.
 Five-passenger touring, 4 cyl., \$1500.
Monroe, Middlesex Motor Car Co., Boston—718.
 Five-passenger touring, \$985.
Moon, Middlesex Motor Car Co., Boston—719-20.
 Five-passenger touring, \$1295.
Napoleon, Rely Motor Sales Co., Boston—723.
Pullman, Frank L. Brown, Inc., Boston—721-2.
 Five-passenger touring, 4 cyl., \$825.
 Four-passenger touring, 4 cyl., \$825.
Puritan, Puritan Motor Car Co., Boston—729.
Ross Eight, Bishop Motor Sales Co., Boston—727-8.
Standard, Standard Automobile Co. of N. E., Boston—724-5.
Westcott, Bishop Motor Sales Co., Boston—727-8.

Cars and Exhibitors

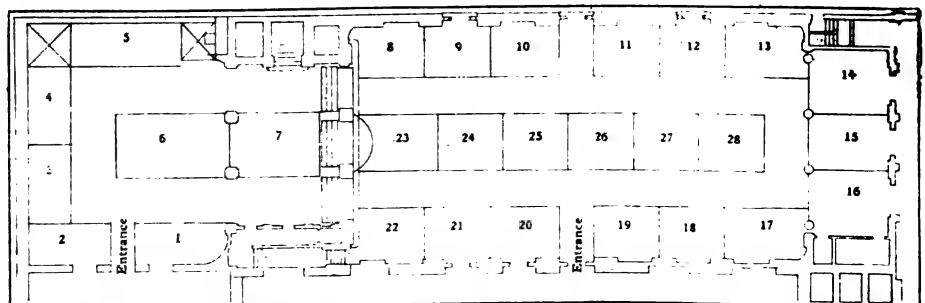
In Copley Plaza Hotel

American Six, Fred S. Smith Co., Boston—17.
Biddle, Geo. W. Canterbury, Inc., Boston—11-12.
Brewster, Brewster Carriage Co., Long Island City, N. Y.—8.
Chandler, Chandler Motors of N. E., Boston—3.
Daniels, J. W. Bowman Co., Boston—25-26.
Disbrow, Disbrow Motors Co., Chicago—1.
Flat, Flat Motor Sales Co., Boston—23, 24.
Franklin, Franklin Motor Car Co., Boston—4.
Jeffery, C. P. Rockwell, Inc., Boston—7.
Locomobile, Locomobile Co. of America, Boston—9-10.
Marmon, Frank E. Wing, Boston—20.
McFarlan Six, Anthony-Pilling Co., Brighton, Mass.—15.
Mercer, Fred S. Smith Co., Boston—17.

Phianna, Alfred Cutler Morse & Co., Boston—5.
Ohio Electric, D. C. Tiffany Co., Boston—16.
Owen-Magnetic, M. F. Chase, Inc., Boston—6.
Pathfinder, Harry Fosdick, Inc., Boston—13-14.
Pierce-Arrow, J. W. Maguire Co., Boston—21-22.
Rommer, Alfred Cutler Morse & Co., Boston—5.
Rauch & Lang Electric, N. Rommelfanger, Boston—2.
Simplex, Geo. W. Canterbury, Inc., Boston—11-12.
Stearns-Knight, J. H. MacAlman, Boston—18-19.
White, The White Co., Boston—27-28.

Accessories To Be Displayed in Mechanics Building

A. B. F. Economizer Co., New York—548.
Abbott Motor Equipment Co., New York—441.
 Two-bly tire foot pump.
 Accessory and Garage Journal, Pawtucket, R. I.—Table.
Aerofram Co., Boston—445.
 Aerofram gas savers, Rand reflectors, Nu Way buttons.
Albany Lubricating Co., New York—546.
 Albany grease, Cook's lubricant, Albany auto oils, alpha greases and oils, gear grease cups.
American Express Co., Boston—425.
American Motor Equipment Co., Boston—529-30.
 Norwalk tires and tubes, Rex spark plugs and Rex ignition cable, Master carburetors, Stanley self-oiling springs.
American Storage Battery Co., Cambridge, Mass.—443.
 Harvard storage batteries, self-starting, lighting, ignition and stationary.
Atwater Kent Sales Co. of N. E., Boston—448.
 Atwater Kent ignition system.
Atwood, J. H. & G. L., Boston—608.
 Automobile supplies and accessories.
Automatic Time Stamp Co., Boston—225.
 The automatic time register, the automatic time stamp, the duragraph elapsed time recorder.
Automobile Dealer & Repairer, New York—514.
 Automobile Journal, Pawtucket, R. I.—Table.
Automobile Legal Association, Boston—536-7.
 Literature regarding association.
Automobile Mutual Liability Ins. Co., Boston—539.
Barnstead Still & Sterilizer Co., Boston—558.
 Stills and sterilizers.
Bigelow-Dowse Co., Boston—525.
Boice Motor Equipment Co., Boston—506.
 Vesta storage batteries, lamps and generators, Heinze Springfield Ford starters, standard speedometers.
Boice-Perrine Co., Boston—432 and 502.
 Rayfield carburetors, Vulcan springs, U. S. L. batteries, Boyce motometers, General Electric starters and "Genemotor."
Boston Starter & Specialty Co., Boston—515.
 Stanwood safety step plates, Boston starters, Branford carburetors, magic tire tools.
Brooks-Skinner Co., North Weymouth, Mass.—531-2.
 All-steel garages, "Wasco" hot water garage heaters.
Bunnell Co., Worcester, Mass.—402.
 Sunderman safety carburetor, Corning conaphore, Deltz vapor system, Jaeger lamp bulbs, platinum ignition contacts, Beeco cable.
Burd Ring Sales Co., Boston—606.
 Burd high compression piston rings, magnallite pistons, Perry Ford auto locks, vapor inspirators, Ward-Leonard electric devices.
Burrill Tire Tool Co., Concord Junction, Mass.—533.
 Burrill tire rim tools.
Caldwell, John, Boston—540.
 Tires, tubes and rubber accessories.
Cape Cod Power Dory Co., Wareham, Mass.—359-64.
Central Automobile Tire Co., Boston—420.
 Automobile tires and inner tubes.
Champion Spark Plug Co., Toledo, O.—434.
Connell Co., W. J., Boston—542-3.
 Sparton horns, Schebler carburetors, Gabriel snubbers, E. & J. lamps, Kellox pumps, spray primer.
Contractors' Mutual Liability Ins. Co., Boston—554.
 Automobile liability insurance.
Cotton, Inc., L. M., Boston—331-4.
Coward Auto Supply Co., Boston—520-1.
 K-P rim tool, K-P foot rest heaters, Viking spark plugs, green hand rear signal.
Craig-Wyman Co., Boston—444.
 Gill piston rings, Ez-E-Kleen spark plugs.
Cut Price Auto Supply Co., Boston—504.
 General line of supplies and accessories.
Davis, H. G., Boston—433.
 Westinghouse air springs.
DeLano & Harriman, Boston—523.
 Legaline lens, magic rubber mend, lubro radiator compound.
Donovan, F. B.—553.
 Webber automatic carburetors, perfection springs, perfection heaters.
Duffy Pieper Sales Co., Boston—440aa.
 "Save-O" for preserving automobile tires.



Floor Plan of the Copley Plaza Ball Room, Where Only High Grade Pleasure Cars Will Be Displayed.

Dyer Co., G. H., Cambridge, Mass.—405-6.
Welding, steel cutting and carbon removing outfit, pistons and garage tools.
Eagle Oil & Supply Co., Boston—541.
Eagleline motor oils, greases, solarine, metal polish and packings.
Eastern Oil Tank Co., Lowell, Mass.—526.
Gasoline tanks and pumps, lubricating oil cabinets, tunnel filters, etc.
Empire Axle Co., Dunkirk, N. Y.—309.
Economizer & Supply Co., Inc., The, Boston—548.
A. B. F. economizer.
Flentje, Ernst, Cambridge, Mass.—511.
The Flentje automatic, hydraulic jounce and recoil preventors for automobiles.
Fracto Specialty Co., Boston—500.
Fracto non-glaring headlight lenses.
Fuller Brush Co., Boston—518.
Automobile cleaning and dusting brushes.
General Appliance Co., The, Boston—557.
The G. A. C. vulcanizer clamp, the G. A. C. foot rest, the G. A. C. automobile shoe repairer, the G. A. C. vacuum line.
Guaranteed Magneto Parts Corp., New York—603.
Magneto, coil, generator and starter parts.
H. & H. Motor Specialties, Inc., Boston—555.
Vapor inspirator, Perry auto locks for locking automobiles, spark plug "answer," ignition lighting cable, Dixon's graphite grease.
Harding, W. A., Worcester, Mass.—312aa.
Harnett-Smith Co., Boston—401.
Automobile transmission electrically driven, Lubriko automobile grease.
Hartley, Harry B., Boston—505.
Dann insert, marvelo auto refinisher.
Hi Lo Jack Co., Worcester, Mass.—602.
Horizontal screw jacks.
Hillman Auto Supply Mfg. Co., Boston—436-446.
Plating and enameling, windshield, radiator and lamp repairing, U. S. E. shock absorbers, Warner lens, H. R. neutrallock.
Hires Turner Glass Co., Philadelphia—449.
Safety glass for windshields.
Holt & Beebe Co., Boston—558A.
Limousine lamps, lamp repairers and platers.
Interstate Rubber Co., Boston—414.
Seamless tires, Apex tires.
Isair Co., Boston—605.
Shock absorbers, automobile tire pumps.
Jackson, Charles A., Boston—604.
Westinghouse starting and lighting system, general lead batteries, J. M. shock absorbers, Hondaile shock absorbers.
John & Arthur, Boston—507.
Johnson Sporting Goods Co., Iver, Boston—601aa-2aa.
Legalite lens, Brown oilers, Victor heaters, Peteler jacks.
Justice Co., A. R., Philadelphia—442.
U-Kan-Plate silver plating polish.
Keating & Decker, Newton, Mass.—557.
Tires and tubes, piston rings, blow-out patches, demountable rims, spark plugs, etc.
Lang Engineering Co., J. S., Boston—503.
"National" automobile shock absorber.
Lebanon Machine Co., Lebanon, N. H.—Table.
Lee Tire Sales Co., Boston—352-3.
Linscott, Rolliston W., Boston—355.
Linscott Supply Co., Boston—516-7-8-9.
13-17 and 245-6.
General line of automobile accessories and supplies.
M. B. Tool Co., Providence, R. I.—410.
Insuletric screw drivers, M-B adjustable valve grinders.
Maddocks Co., H. Ross, Boston—340-3.
Martin Rocking Fifth Wheel Co., Springfield, Mass.—356-7-8.
Mass. Mutual Auto Ins. Co., Boston—538.
Maxim Motor Co., Middleboro, Mass.—221.
Mead Morrison Mfg. Co., East Boston—309aa.
Patent loading and hoisting winch for auto trucks.
Meyers Bros., Bronx, N. Y.—331aa.
Miller, Charles E., Boston—435.
Automobile supplies.
Mitchell & Smith, Inc., Boston—544-5.
Ford starting and lighting system, wire wheels, fan belts, belting, gaskets, etc.
Moreton, Walter H., Boston—564.
Scripps & Gray marine engines, Evin-

rude detachable row boat and canoe motors.
Motor Accessories, Inc., Boston—507.
Demountable rims, general line of supplies and accessories.
Motor Parts Co., Boston—510.
Bosch products, Rushmore lighting and starting systems, Zenith carburetors, leak proof piston rings and auto cable.
Motor Trade Pub. Co., New York—Table.
Motor Truck, Pawtucket, R. I.—Table.
Motor Vehicle Pub. Co., New York—514.
National Automobile Assn., Boston—509.
Route maps and literature.
National Express Co., Boston—425.
Needham Tire Co., Charles River, Mass.—524.
Needham tires, Needham inside sleeves, Needham cementless patches.
New York Lubricating Oil Co. Boston—440.
Monogram oils and greases.
Nutter Electric Equipment Co., Boston—403.
Portable electric tire pump, electric air tank outfits, air stations, portable electric drill, Hyatt-Watt waterproof batteries.
Optimus Mfg. Co., Boston—412.
Automobile polish.
Pettingell-Andrews Co., Boston—527.
"Eveready" non-sulphating storage batteries, "Eveready" Ford electric starters, "Genolite" electric lighting equipment for Ford cars, "Old Sol" spotlights, etc.
Planet Co., Westfield, Mass.—409.
Duplex foldables, Planco folding water bucket.
Polac Co., Boston—547.
Polac auto polish and cleaner, polac varnish.
Pressure Proof Piston Ring Co., Boston—447.
Piston rings.
Pruden Co., C. D., Boston—522.
Prudential steel buildings and garages.
Rand, H. L., Worcester, Mass.—552.
Specialties.
Robinson & Son Co., W. C., Boston—528.
Lubricating oils and greases.
Salman, John A., Boston—556.
Novelties.
Sewell Cushion Wheel Co., Detroit, Mich.—563.
Sewell cushion wheels.
Sexton Oil Co., Chicago—415.
Special oil, "Motor Youth."
Shaw Propeller Co., Boston—512.
Shaw auto wrenches.
Silvex Co., Bethlehem, Penn.—508.
Bethlehem 5-1 point spark plug, Bethlehem 1-1 point spark plug, Bethlehem steel pneumatic shock absorbers.
Standard Oil Co. of N. Y., Boston—437-8.
Gasoline, kerosene and lubricating oil, Gilbert & Barker tanks, measuring and non-measuring pumps, Polarine lubricating oil and greases.
Star Rubber Co., Akron, O.—562.
Star tires, red star and silver star tubes.
Sterns Tire and Tube Co., St. Louis—407-8.
Sternwear tubes and casings.
Texas Co., Boston—419.
Texaco motor oils, gasoline, greases, etc.
Thompson Co., E. L., Boston—561.
Bumpers, tool boxes, mirrors, horns and shock absorbers.
Transport Tractor Co., Long Island City, N. Y.—217.
Underhay Oil Co., Boston—534-5.
Automobile oils and greases.
United Chemical Co., Boston—411.
Premier spray automobile body polish, Premier enamel cleaner, Premier metal polish.
U. S. Air Compressor Co., Cleveland, O.—501.
Air compressors for garages.
U-Sav-Your Mfg. Co., Warren, Mass.—559-60.
Automobile cleanser and dressing, automobile polish.
U. S. Rubber Co., Boston—439.
Accessories and supplies.
Vesuvian Auto Heater Sales Co., Boston—600.
Victrolene Co., Boston—450.
Victrolene, automobile body polish.
Warner-Lenz Sales Co., New York—441.
Webber Mfg. Co., Boston—553.

Wells Fargo & Co.'s Express, Boston—425.
White & Bagley Co., Worcester, Mass.—431.
Ollum motor oils and lubricants, Wash-zum car soap, Cleanzum hand cleaner.
Wilson Co., John V., Boston—549-50-1.
Automobile lamps, tool and battery boxes, bumpers, shock absorbers, electrical specialties, Ford specialties.
Wood-Detroit Mfg. Co., Detroit, Mich.—400.
"Autograms" (metal monograms), "Woco" running board mats.
Wright "Name On" Robe Co., Waterville, Me.—404.
Wright "Name On" robe.
Young Co., E. C., Randolph, Mass.—224.
Young's portable garages.

To Be Displayed in Horticultural Hall

Allen Engineering Co., Boston—743a.
Allen garage air compressors, Allen battery charging outfits.
American Bureau of Engineering, Boston—745.
Black, Henry B., Boston—743b.
"Quik-Eazy" tire tool, any angle wrench, spring oilers.
Butts & Ordway, Boston—739.
Accessories for automobiles.
Carr, Geo. E., Boston—732.
Amazon tires.
Carter Hide Co., Boston—730.
Spun and curled hair in bags, Hyde Park brand.
Davis Research Laboratory, Lynn, Mass.—741.
Batteries and construction parts.
Dexter Co., Samuel L., Beverly, Mass.—738.
Fernald Shock Absorbing Spring Suspension, Boston—707.
Shock absorbing spring suspension.
Ford Co., Percy, Boston—704a.
Holland, James L., Boston—736.
Holland Trallercar Co., New York—704b.
Howe Rubber Co., Boston—742.
Howe tires and inner tubes.
Killian, Lawrence J., Boston—708.
King Trailer Co., Ann Arbor, Mich.—711aa.
Metropolitan Motors, Inc., New York—700.
Miller Carburetor Sales Co. of N. E., Boston—731.
Miller carburetors.
New England Equipment Co., Boston—740.
National rubber tire filler, "Robertson" auto soaps, etc.
Norris, Charles S., Boston—726.
Pluggers Co., Boston—737.
Bales' puncture pluggers.
Presto Cloth Mfg. Co., Toledo, O.—744.
Presto-Cloth, a windshield wiper cloth.
Rynehart Rim Tool Co., Brooklyn, N. Y.—706.
Rim tool for removing and putting on split rims on auto shoes.
Stanley Insulating Co., Great Barrington, Mass.—735.
Fermostat vacuum bottles.
White, Virgil D., West Ossipee, N. H.—733-4.
White's snow attachment.

Motor Trucks

Exhibitors and Models

To Be Seen at Show

Atlas, Signal Motor Truck Co. of N. E., Boston—201-2.
1200 pounds, four cylinders, \$750.
Atterbury, Atterbury Motor Car Co., Buffalo, N. Y.—209-10-11.
Autocar, Autocar Sales and Service Co., Boston—322-3-4-5-6-7.
Model 21-UF, 1½ tons, \$1650.
Brockway, Brockway Motor Truck Co., Boston—200.
Model O, 1 ton, \$1500.
Model K-2, 2 ton, \$2250.
Cunningham, Cunningham & Son Co., Jas., Boston—313-4.
Hearse, eight cylinders, \$4500.

- Denby, McIntyre Co., J. D., Cambridge, Mass.—247.**
Model 12, 1 ton, \$1275.
Model 15, 2½ ton, \$2150.
- Federal, Boston Federal Truck Co., Boston—819-20.**
General Motors Truck Co., Boston—218-9.
Model 15, ¾ ton, \$1150.
Model 31, 1½ ton, \$2100.
Model 41, 2 ton, \$2550.
Model 101, 5 ton, \$4100.
- Hamm-Bernstein, R. E. Taylor Corp., Cambridge, Mass.—226-7-8 and 235-6-7.**
1 ton, \$1750.
1½ ton, \$2200.
2 ton, \$2500.
2½ ton, \$2900.
3½ ton, \$3650.
5 ton, \$4500.
6 ton, \$4700.
- Holland Trailer Car, Holland Trailer Car Corp., New York—711a.**
Model A, trailer for touring cars.
- Hudford, Hudford Boston Co., Boston—228-9 and 413.**
1 ton, \$700.
2 ton, \$800.
1 ton Hudford unit.
- Hurlburt, Baker Motor Truck Co., Day, Boston—311.**
3½ ton, \$3500.
7 ton, \$5000.
- International, International Harvester Co., Somerville, Mass.—222-3.**
Model H, ¾ ton, \$1225.
Model F, 1 ton, \$1500.
Model G, 2 ton, \$2000.
- Kelly-Springfield, Kelly-Springfield Motor Truck Co., Boston—315-6.**
Model K-32, 1½ ton, \$2250.
Model K-36, 2½ ton, \$3000.
Model K-40, 3½ ton, \$3560.
- Krebs, Oakland Motor Co. of N. E., Boston—220.**
Model 60, 2 ton, \$2425.
Model 48, 1½ ton, \$2100.
- Longford, Longford Co. of America, Cambridge, Mass.—240-1.**
Longford truck attachment for Fords.
- Mack, Mack Motor Truck Co., Cambridge, Mass.—242-3-4.**
Model A C, 5½ ton, \$5035.
Model A C, 3½ ton, \$3745.
- Martin Trailer, Martin Rocking Fifth Wheel Co., Springfield, Mass.—356-7-8.**
1 ton trailer for Ford cars, with attachment.
1 18-inch rocking fifth wheel.
1 24-inch rocking fifth wheel.
1 30-inch rocking fifth wheel.
- Maxim, Maxim Motor Co., Middleboro, Mass.—221.**
Chemical hose cart, \$3750.
- Menominee, Victor Motor Car Co., Boston—338-9 and 344-5.**
Model EW, ¾ ton, \$1295.
Model H, 1½ ton, \$1775.
Model G, 3½ ton, \$2775.
- Netco, New England Truck Co., Fitchburg, Mass.—308.**
Model D, 2 ton, \$2450.
- Overland, Connell & McKone Co., Boston—301-2.**
1200 pound, \$850.
800 pound, \$700.
- Packard, Packard Motor Car Co., Boston—203-4-5-6-7-8.**
2½ ton, chassis price \$2850.
4 ¼ ton, chassis price \$4040.
3 ¾ ton, chassis price \$3457.
5 ½ ton, chassis price \$4375.
6 ½ ton, chassis price \$4625.
1 ½ ton, chassis price \$2250.
1½-1 ton, chassis price \$2550.
1 ¼ ton, chassis price \$2250.
- Pierce-Arrow, J. W. Maguire Co., Boston—248-9-50-1-2-3.**
- Reo, Linscott Motor Co., Boston—212-3.**
Model J, 2 ton, \$1700.
Model F, ¾ ton, \$1050.
Model F, hearse, \$1850.
- Selden, Baker Motor Sales Co., Cambridge, Mass.—303-4-5-6-7.**
1 ton, \$1385.
5 ton, \$3850.
- Signal, Signal Motor Truck Co. of N. E., Boston—201-2.**
Model F, 1 ton, \$1550.
Model H, 1½ ton, \$1800.
Model T, 2 ton, \$1800.
Model M, 3½ ton, \$2000.
Model R, 5 ton, \$4000.
- Smith Form-a-Truck, John L. Judd, Boston—328.**
1½ ton truck attachment for Ford, Dodge, Buick, Overland, Chevrolet and Maxwell cars, \$350.
- Stewart, H. Ross Maddocks, Boston—340-1-2-3.**
Model 6, ¾ ton, \$795.
Model 8, 1 ton, \$1390.
Model 4, 1½ ton, \$1485.
Model . . . 2 ton, \$1700.
- Studebaker, Studebaker Corp. of America, Boston—335-6-7 and 346-7-8.**
¾ ton, express body, \$925.
¾ ton, truck body, \$925.
1 ton, special panel, \$1650.
1 ton, stake body, \$1350.
1 ton, express body, \$1300.
1 ton, chassis, \$1200.
- Transport Tractor, Transport Tractor Co., Long Island City, N. Y.—217.**
5 ton, four cylinder tractor, \$2500.
- Vim, Vim Motor Truck Co., Boston—214-5-6.**
1000 pound, \$645 Philadelphia.

New Two Unit Starting and Lighting System

The Splitdorf Electrical Co., Newark, N. J., have designed a new two-unit starting and lighting system.

The generator unit has the regulator cut-out mounted on its top, and the commutator and brushes of the generator are readily accessible by removing the band from the front. The rear generator bearing receives its lubrication from the timing gear case; the front, or commutator bearing, has an oiler at the front, while the distributor shaft housing is provided with a screw plug for heavy oil. The output of the generator is controlled by the regulator cut-out, which is so set that the generator will not deliver more than 10 amperes no matter what the speed of the car may be. The starting motor drives the flywheel by the Bendix drive.

The whole system is compact and simple and while installations for various types of cars may vary according to individual requirements, the principle of the system remains the same.

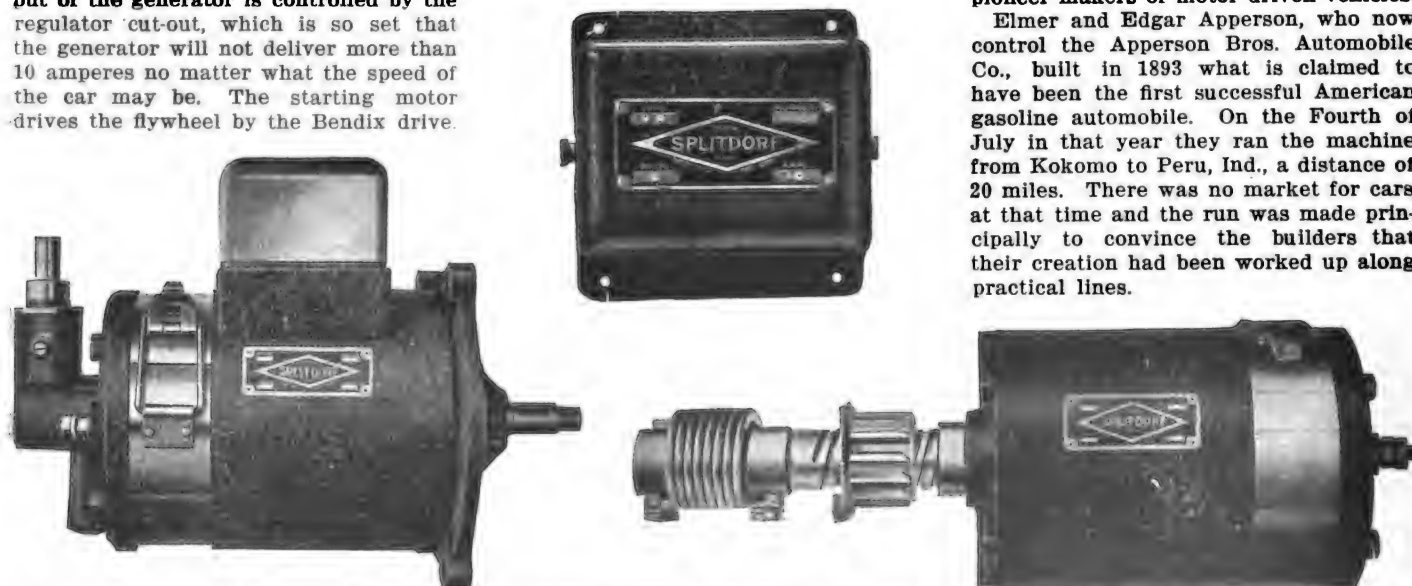
The manufacturers of the following named pleasure cars have adopted the Splitdorf two-unit starting and lighting system for their 1917 products: Briscoe model 24, Hollier model 178, Mitchell model D-40, Pullman model 424, Standard model F and the Emerson. Among the truck makers the following use the sys-

tem as standard equipment: Denneen Motor Co., Rainier Motor Truck Co., Lawson Mfg. Co. and the Rush Delivery Car Co.

APPERSON BROTHERS PIONEER MANUFACTURERS.

The Apperson brothers of Kokomo, Ind., who manufacture the well known automobile bearing their name, have been identified with the automobile industry since its inception and were pioneer makers of motor driven vehicles.

Elmer and Edgar Apperson, who now control the Apperson Bros. Automobile Co., built in 1893 what is claimed to have been the first successful American gasoline automobile. On the Fourth of July in that year they ran the machine from Kokomo to Peru, Ind., a distance of 20 miles. There was no market for cars at that time and the run was made principally to convince the builders that their creation had been worked up along practical lines.



Units of the New Splitdorf Two-Unit Starting and Lighting System, the illustration at Left Showing the Combined Regulator and Generator; at Top Centre, Regulator Unmounted, and at Right, the Motor Unit.

Two years later the brothers brought out the first double opposed gasoline engine ever made in the world, which is today looked back upon as the forerunner of the present day multiple cylinder motor. And at present there are engineers who predict that eventually the most efficient multiple cylinder motor will be built along lines similar to the double opposed cylinder type originated by the Apperson brothers.

In the same year, 1895, the Apperson brothers entered the car in the "Times-Herald" race at Chicago, which was the first event of its kind ever held in the world. They were awarded a cash prize for having constructed the best designed gasoline engine for use in a motor car power plant.

During the following year, 1896, Elmer Apperson drove his car as a special attraction with the Robinson and Franklin circus and his machine proved one of the most attractive exhibits in the "World's Congress of Wonders." On Independence day of that year he drove in races at Sioux City, Ia., over a one-mile track and in the fall of the same year had his machine at the Minneapolis bicycle show, where he hauled passengers about the big hall at 10 cents each. In referring to that experiment, Mr. Apperson said it was very difficult to secure passengers, as everyone at the show felt as though they were risking their lives to ride in the machine. Automobiles were then considered as freakish novelties.

Elmer Apperson remembers with great pride the time when he drove to a ball game in his "horseless wagon" and both the spectators and players abandoned the game to gather about and inspect his machine.

At the Charles River Park track, in Boston, where the first speed contest for automobiles was held, Edgar Apperson drove an Apperson car and won the event. The next year, 1898, he drove an Apperson car from Kokomo, Ind., to New York City, a distance of 900 miles. This trip was made to deliver a car to a customer who resided in New York.

The Apperson brothers won the 100-mile non-stop run in the Long Island Automobile Club contest and also the first and second prizes in the first cross country run, the course being from New York to Buffalo, N. Y. These events were held in 1901, and during this same year Edgar and Elmer formed the Apperson Brothers Automobile Co., with an original capital of \$23,000. The years following brought constantly increasing prosperity and expansion to the Apperson company.

The Apperson brothers, however, were not eager for financial honors, but were busy building their ideals into their product. In 1909 the Apperson "Jack Rabbit" won first place in the Pasadena Altadene Hill Climb in California, covering 1.4 miles of 11½ per cent. average grade from standing start in one minute 24 seconds, a speed of 60 miles an hour. Edgar Apperson drove the car.

The "Apperson Roadplane" is the latest of the Apperson brothers creations and the production of this model will total 4500 for 1917.

How New York Handles Traffic

Commissioner Woods Believes In First Warning Violators of City's Traffic Regulations

At the luncheon of the Fifth Avenue Club, held in New York City, Washington's Birthday, Police Commissioner Woods of that city told the members how a new system was being worked out in handling violators of the traffic regulations. He explained that instead of hailing into court those who were driving very near or slightly beyond the speed limit they were warned by a traffic officer who then records the occurrence.

Mr. Woods said that the new method had resulted in cutting down the arrests from 40 to 20 a day, with the result that less of the traffic officers' time was required in court and they could remain on their posts. Reasonable operators take cognizance of the first warning and are not again found to be violators of any of the regulations. There were, however, some, he explained, who had been warned twice and some others who were arrested, as it was hopeless to try to cure them by warnings.

WALDEN-WORCESTER 1917 EDITION OF MOTORISTS RECORD.

The Walden-Worcester 1917 edition of Motorists Record has been published and is ready for distribution among owners, dealers and garage men, free of charge. This book, which is vest pocket size, is printed annually by the Walden Worcester, Inc., manufacturers of the Walden-Worcester wrenches, and enables the owner of a car to keep a complete record of the cost of operating a gasoline car in addition to furnishing other data of value.

There are separate record sheets in the book for recording the cost of gasoline, oils, tires and repairs and for totaling up each individual account so that the owner at a glance can tell what his maintenance and operating costs have been and their relation to mileage covered.

These books will be forwarded to motorists upon application to the Walden-Worcester, Inc., Worcester, Mass. Dealers and garagemen will upon request be furnished with quantities suitable to supply their customers.

DODD HANDLES BUREAU OF ENGINEERING ACCOUNT.

A. M. Dodd, advertising and selling agency, Ellsworth building, Chicago, Ill., will handle the advertising account of the American Bureau of Engineering of the same city.

NEW YORK HAS 25,000 TRUCKS FOR TROOPS.

A census compiled by Francis M. Hugo, secretary of state of New York, shows that owners in the state could contribute about 25,000 motor trucks in case of war. Mr. Hugo has figures showing that there are over 20,000 trucks within the immediate vicinity of New York City that, on a few hours notice, could be made available in the event of hostilities for the transportation of troops and munitions through Long Island, New Jersey and along the Atlantic seaboard. There are over 317,000 pleasure cars at present registered in New York state which would enable the military authorities to move a big army at very short notice.

TOURING RECORD NO. DAY PLACE HOTEL TIME SPEED 1 2 3 4 5 6 7 8 9 10 11 12	GENERAL DATA CAR NO. MODEL YEAR REGISTERED IN. H.P. RATING /P ALARM /P TIRE CLUNKER REMARKS OVERSHE ELECTRIC LAMP ALL VOLTS CABLE POWER REAP. TAIL SIDE / Dash	GASOLINE GALLONS USED DATE FROM GAL. COST DUES 1 2 3 4 5 6 7 8 9 10 11 12
HEAVY OIL RECORD TRANSMISSION DIFFERENTIAL CLUTCH NO. DAY SPEED REPAIRS NO. DAY SPEED REPAIRS	OWNERS NAME ADDRESS	EXPENSE - REPAIRS DATE MEMO. SPEED REPAIRS ART.
CYLINDER OIL RECORD DATE FROM GAL. COST SPEED REPAIRS	INSURANCE FIRE AMOUNT POLICY NO. PREMIUM LIABILITY AMOUNT POLICY NO. PREMIUM PROPERTY DAMAGE AMOUNT POLICY NO. PREMIUM THEFT AMOUNT POLICY NO. PREMIUM	INNER TUBES & REPAIRS DATE MEMO. SPEED REPAIRS ART.
(Empty space for additional records)	(Empty space for additional records)	TIRE RECORD H.P. NO. DATE FROM GAL. COST DUES 1 2 3 4 5 6 7 8 9 10 11 12

Some of the Pages Contained in the 1917 Walden-Worcester Motorists' Record.



FOOT ACCELERATOR.

The New Era Foot Accelerator can be attached to any Ford car in a few minutes. There are no holes to drill nor is any machine work needed. It furnishes a perfect foot control and enables the driver to get the car under full speed in a minimum amount of time, and leaves his hands free to operate the steering wheel, horn or brakes.

Manufactured by New Era Spring and Specialty Co., 717 Mather St., Chicago, Ill. Price complete, \$1.

AUBURN VALVE LIFTERS.

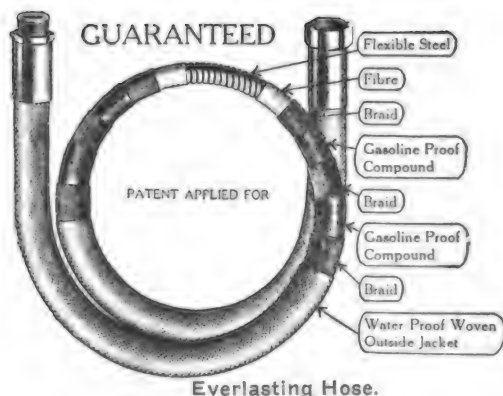
This is a so-called one-piece, self-adjusting valve spring lifter, made of malleable iron. The manufacturers claim that it cannot get out of order, as it has no hooks, springs or chains, and no separate pieces to become lost. It is made to fit all cars and is finished in black.

Manufactured by Auburn Ignition Mfg. Co., Auburn, N. Y. Price, 75 cents.

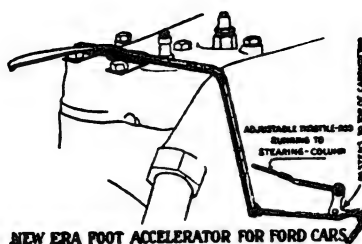
EVERLASTING HOSE.

This is a flexible gasoline hose in which no rubber is used; at the same time, however, it has the flexibility of rubber tube. It is constructed of a flexible steel core, covered with two plies of gasoline proof compound. Outside of this is a braid covering, which is protected by the final outside covering of water proof woven fabric. This hose is guaranteed for one year and is sold in any length and is made in two sizes, with couplings attached.

Manufactured by Chicago Tubing and Braiding Co., Chicago, Ill. Price, $\frac{3}{4}$ inch size, \$1 per foot; $1\frac{1}{4}$ inch size, \$2 per foot; couplings extra.



Everlasting Hose.



NEW ERA FOOT ACCELERATOR FOR FORD CARS.



Outlook Cleaner.



Auburn Valve Lifter.



Rear Seat Windshield.



Triumph Magnetic Gage.

OUTLOOK CLEANER.

The Outlook cleaner is a device which is attached to the windshield of the automobile. An adjustable wiper is held against the outside of the windshield and fastened to it is an arm which may be reached from the seat of the machine. By swinging this arm through a half circle rain, snow or fog is automatically removed from the portion of the windshield over which the wiper passes. This device is made in two styles, one for open cars that is attached to the top of the windshield, the other for closed cars, which is attached through the glass.

Manufactured by The Outlook Co., 5518 Euclid Ave., Cleveland, O. Price \$1.50 for either style.

REAR SEAT WINDSHIELD.

The windshield shown in our illustration is designed for Ford cars and intended to protect the passengers on the rear seat from the dust and winds, from which the driver is protected by the dash windshield. The shield is made of heavy rubber cloth with transparent partitions, as illustrated, and fastens to top and front of back seat.

Manufactured by The J. P. Gordon Co., Columbus, O. Price, \$6. Mention year of car when ordering.

CORCORAN CROWN FENDERS.

Our illustration shows the distinctive appearance given to a Ford car by equipping it with the Corcoran Peerless attachment and crown fenders. All parts are furnished, finished with two coats of black enamel baked on.

Manufactured by The Corcoran Mfg. Co., Cincinnati, O. Write for prices stating year and model of car.



Corcoran Crown Fenders.

TRIUMPH MAGNETIC GAGE.

The Triumph magnetic gage is an indicator which may be applied to any shape tank, either portable or stationary, for indicating the amount of liquid therein. These gages are made for either pressure or gravity systems and the amount of pressure does not effect the gage. A hollow metal float, tested to 100 pounds pressure, is threaded upon a gun metal bronze ribbon, which is suspended from the top of the tube, and to which a permanent magnet is attached. The bronze ribbon passes through a tube in the centre of the float. As the float travels up and down inside the tube of the gage with the rise and fall of the fluid in the tank, it is turned by a spiral cut in the tube. This naturally causes the metal ribbon to revolve and turn the magnet, which exercises its power through the solid head of the gage, and turns the magnetic hand on the face of the dial. This construction permits a perfect sealing of the gage face to make the instrument fume, dust, moisture and air tight.

Manufactured by Boston Auto Gage Co., 8 Waltham St., Boston, Mass. When writing for quotations give dimensions of tank.

DANN INSERT.

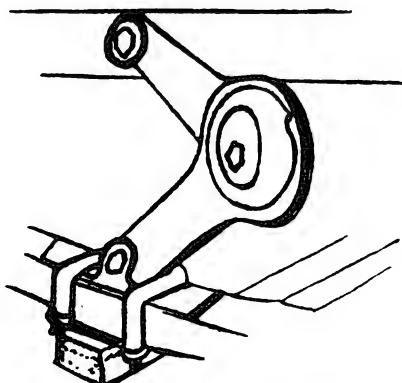
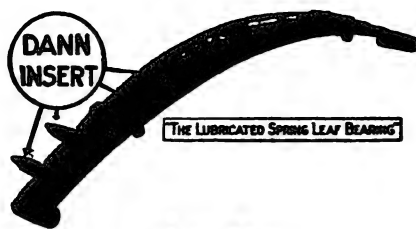
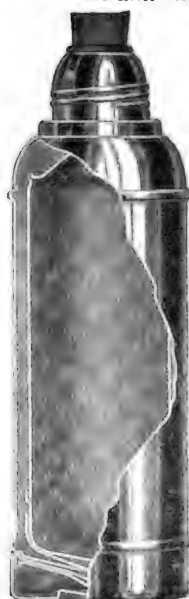
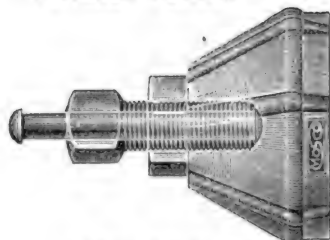
The Dann Spring Insert is intended to lubricate and form bearing surface for the spring leaves in the same manner that the bearings of the engine work. It is a strip of perforated bronze, the perforations containing a specially prepared graphite, to be placed between the spring leaves. The Dann Products Co., the manufacturer, claim that it is a great help in reducing vibration.

Represented in New England by Harry B. Hartley, 243 Columbus Ave., Boston, Mass.

RIENIE AUTO PATCH.

The Rienie Auto Patch may be applied without the use of special tools or heat. A layer of cured rubber is placed between two layers of especially prepared raw rubber and when applied the whole is covered by a layer of fabric, which adds to the strength and wearing qualities of the patch.

Manufactured by Durkee-Atwood Co., Minneapolis, Minn. Prices upon application.

**Mondex Shock Preventer.****Dann Insert.****Ferrostat Vacuum Bottle.****Mosco Wheel Puller.****Pedex Pedal Extension.****WHEEL PULLER.**

The Mosco Floating Plunger wheel puller is made to fit 172 models of 32 popular cars. The special feature of this puller is the floating plunger, which slides in the pressure screw. When the wheel is stuck or frozen to an axle a tap of the hammer on the head of the plunger will generally loosen the wheel.

Manufactured by Motor Specialties Co., Waltham, Mass. Prices and catalogue upon application.

MONDEX SHOCK PREVENTER.

The Mondex Shock Preventer consists of a series of inclined planes or cams—expanding and contracting disks of firm, but resilient rubber—which work on the wedge principle. When the body of the car moves downward the cams of the shock preventer expand and compress the rubber discs. The further the car body is forced downward on the axle the more forcibly are the rubber disks compressed. But on the rebound of the springs resistance is applied instantly.

The Mondex Shock Preventer does not work on friction, but on graduated compression of rubber by thoroughly lubricated inclined planes. These planes ride up on each other according to road conditions.

Manufactured by Puritan Machine Co., Detroit, Mich. Price per set of four, \$12.

PEDEX.

Pedex, a pedal extension device, makes it possible for two persons of different height to drive the same car with equal comfort. Pedex is designed to be attached to both the brake and clutch pedals, and the use of the permanent pedals is in no way impaired. Two adjustments are possible, so that the foot may be placed in a position of greatest comfort. In touring this article is a great help to the driver, making it possible for him to rest his feet by shifting to a new position.

Manufactured by American Car Accessories Co., 529 West 21st St., New York, N. Y. Price, \$5 per pair.

FERROSTAT VACUUM BOTTLE.

Our cut shows the construction of what the makers term an indestructible vacuum bottle. Ferrostat is constructed entirely of steel and has no removable parts except the cork and cup, and, therefore, there are no unsealed openings into which liquids may leak. All joints are solid welded. The interior surface has a highly glazed enamel finish, while the outside is finished in either nickel or rubber.

Manufactured by Stanley Insulating Co., Great Barrington, Mass. Prices range from \$6 to \$9.50 according to size and finish.

**Rienie Auto Patch.**

LINE CARBURETOR HEATER.

This is an ingenious device for using electricity to heat gasoline in a carburetor float chamber. Gasoline vaporizes more readily when the temperature is increased, which is the principle upon which the Line Carburetor Heater is constructed. The device is simply wrapped around the bowl of the carburetor and two wires are run to a six-volt battery through a switch. When the switch is closed the heat generated by the resistance coil in the device warms the gasoline in the carburetor.

Manufactured by Mechanical Utilities Corp., 5 North La Salle St., Chicago, Ill. Price, \$3.

DYER PISTONS.

The Dyer light weight piston for Ford cars is designed to fill the demand for a light, yet strong piston. The maker explains that the metal is composed of elements which insure perfect bearing surfaces, toughness and durability, and that the castings are machined by special process to insure a uniform thickness of piston wall and a wrist pin hole, which is square with the sides of the piston. Special attention is paid to oil grooves. These pistons are made in standard and a number of oversizes and sold complete with wrist pin and rings. The manufacturer asserts that these pistons weigh one pound less than the standard Ford type, and that the limit of variation in weight is only two ounces.

Manufactured by the G. H. Dyer Co., 155 Brookline St., Cambridge, Mass. Write for prices.

VALVE AND TIRE TOOL.

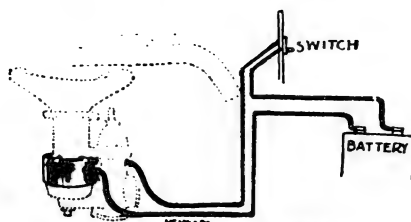
One of the many uses of this combination tool are shown in the illustration. For removing valve springs, etc., one of the hooks is placed over the manifold clip, the spring raised by the lever, which is hooked to the frame by the other catch, as shown. The valve spring may be left supported by the tool until the valve is replaced. This device may also be used as a tire tool. The end of the lever is inserted under the tire bead, the shoe pried over and the lever hooked to a spoke, thus giving an open point upon which to work.

Manufactured by King Specialty Mfg. Co., Brookline, Mass. Price, 75 cents.

LONG HENRY SPARK PLUG.

The new Long Henry Spark Plug is now on the market. It has an extra long hex, which enables handy wrench operation and the deep petticoat and insulation, together with the large clearance insures the plug against fouling. To quote the manufacturer, "Long Henry is a big, beautiful, aristocratic spark plug, specially designed to meet the requirements of the Ford engine."

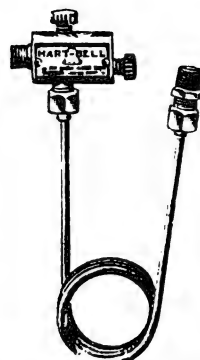
Manufactured by Auburn Ignition Mfg. Co., Auburn, N. Y. Price, 75 cents.



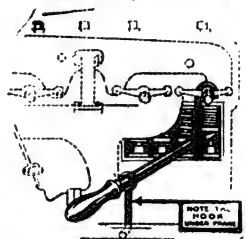
Line Carburetor Heater.



National Shock Absorber.



Carbon Remover.



Valve and Tire Tool.



Dealers Display Stand Lighting System.



Above, Dyer Light Weight Piston. At Right, Long Henry Spark Plug.

**SHOCK ABSORBER.**

The National shock absorber consists essentially of a casing through which two blades pass, the movement being controlled by a set of specially designed shoes and cam rollers. The result of this construction, the makers say, is an unique but scientifically correct mechanism which permits perfect freedom of contraction of body springs, thereby preserving all their initial resiliency, but so retarding or modifying the rebound as to eliminate all shock and vibration.

Manufactured by J. S. Lang Engineering Co., 5 Park square, Boston, Mass. Prices upon request.

LIGHTING SYSTEM.

The dealers' display stand shown in the illustration is intended as a demonstration board for Genolite, Dynolite and Constolite, three lighting systems. The board with all necessary brackets and attachments is furnished at same price as regular equipment and can be dismantled at any time and the systems installed upon a car.

Genolite system type C consists of a generator, a storage battery, two electric side lamps, electric tail lamp, headlight light control, operated from switch on steering post, with all wiring and connections. Type D has in addition to the equipment of C a windshield spotlight.

Dynolite consists of windshield spotlight with regulator, switch and wiring, and designed to attach to the Ford car magneto.

Constolite consists of bulbs for headlights, regulator, dimming switch and wiring, and is designed to be attached to the Ford car magneto.

Made by the Detroit Starter Co., Detroit, Mich. Retail price of type C Genolite, \$29.85; Type D, \$31.85; Dynolite, \$6.85; Constolite, \$4.85.

CARBON REMOVER.

The Hart-Bell Carbon Remover not only removes carbon, but is also intended to prevent its accumulation. This device consists of a valve, which is screwed into the water cooling system, a length of tubing and a connection which is screwed into the carburetor manifold. The valve for the water cooling system has two adjustments, one to regulate the amount of water, the other the amount of air which passes through the tube to the intake. At each intake of gas a certain amount of water is admitted to the cylinder, which is immediately vaporized and cleans off the carbon deposits.

Manufactured by Hart-Bell Co., Times Bldg., N. Y. Price, \$5.

PETRY CUT-OUT.

The Petry cut-out is designed on scientific lines and is placed in the exhaust line between the engine and the muffler. The gas in passing through it is deflected over the valve to a very slight extent. This valve is so arranged that it does not obstruct the free pas-

sage of gas to any extent and when it is opened the gas is deflected through an opening to the air at a slight angle. When in this position it prevents the passage of gas to the muffler. A feature of this cut-out is the adjustable valve lever, which may be placed in any position in a circle; another feature is the removable side. The valve may be taken out without detaching the cut-out from the exhaust connections.

Manufactured by N. A. Petry Co., Inc., Philadelphia, Pa. Prices from \$3.50 for 1½ inch size to \$4.50 for 2½ inch size.

RONSON WRENCH.

The new Ronson wrench combines eight size wrenches in one. A twist of the lock nut releases the size wanted. In addition to these wrenches, a screw driver, a bottle opener, and an alligator jaw wrench are contained in the combination. The whole outfit weighs but half a pound, is six inches long and ½ inch thick, and may be carried in the vest pocket.

Manufactured by the Art Metal Works, 7 Mulberry St., Newark, N. J. Write for prices.

SNOW ATTACHMENT.

We show here a novel device for attachment to an automobile for winter driving. The makers claim that with this device a car can be driven practically anywhere a horse and sleigh can go over snow with the same ease that is attained over the clear road under ordinary conditions in summer. This attachment can be applied quite quickly and does not injure the car in any way. The car can be easily changed back for summer driving.

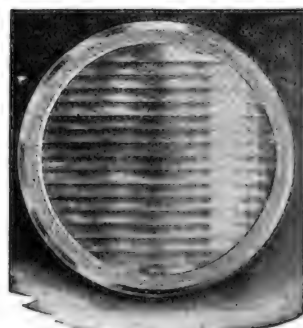
Manufactured by the Automobile Snow Attachment Co., West Ossipee, N. H. Write for particulars.

OPTIMUS AUTO POLISH.

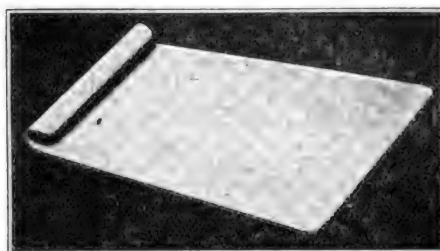
A new automobile polish is announced under the name Optimus, which the makers expect to become a nationally known name. Tests of this polish have been made under the severest working conditions. A one-pint can of Optimus will clean and polish an average sized car twice, and the makers say that in many instances the polish imparted has lasted



Robe Rail.



Legalite Lens.



Shovel and Jack Base.



Optimus Auto Polish.

for several months. This preparation removes dirt and gum from the surface of the car and restores the original factory shine, after which treatment an occasional washing with water is all that is necessary to preserve its appearance.

Manufactured by the Optimus Mfg. Co., Inc., 193 Hanover St., Boston, Mass. Price for one pint can, \$1.

LEGALITE LENS.

Legalite lens is a scientific arrangement of planes of glass which keep the rays of light within 3½ feet of the ground and concentrates those rays so that the light is strongest where it is needed when driving. Legalite lens is made in ¼ inch sizes so as to fit any lamp and can be placed in the lamp in a few moments.

The distributors of the above lens also market Lubro Radiator Compound, a powder used for stopping leaks in radiators and cylinders, and magic rubber, which is a pure gum rubber in spongy form and is used for repairing tubes or tires. Magic rubber requires no heat in applying and in a few minutes dries as hard as original rubber. When dried it does not peel off.

Marketed by De Lano & Harriman, 288 Columbus Ave., Boston, Mass. Prices and literature on request.

ROBE RAIL.

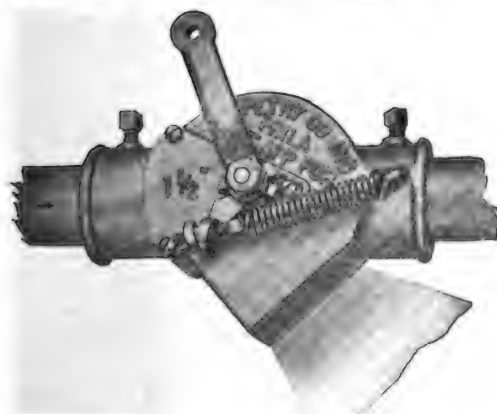
Our illustration shows a detachable robe rail which has just been placed upon the market. One end is detachable to facilitate placing of coat or robe in position. The centre is leather over cord and the ends are nickel plated. It is regularly furnished in 18-inch lengths; other lengths to order. Special size for Ford cars, 24 inches long.

Made by Ideal Brass Works, Indianapolis, Ind. Price, 75 cents each.

SHOVEL AND JACK BASE.

The combination shovel and jack base shown in the illustration is made of heavy galvanized steel nine by six inches and weighs 1½ pounds. It will be found very useful to clear a space for the jack and to stand the jack upon as a base.

Manufactured by the Laconia Car Co., 60 Congress St., Boston, Mass. Price, 50 cents.



Petry Cut-Out.



Ronson Wrench.



Snow Attachment for Motor Cars.

JOINTLESS PISTON RINGS.

Jointless piston rings are designed to insure uniform radial pressure upon cylinder walls. Each ring consists of two pieces, circular in form, cut across their circumference like the ordinary type. The two ends of each piece are on opposite sides of the circumference and are slightly thinner than the rest of the ring so as to fit into a projection which extends from the back of its companion piece. When in place on the piston there is no opening directly or diagonally across the assembled ring. A feature of the jointless construction is the absence of exposed ends, as has been described above; the ends are inside the ring and do not touch the cylinder walls.

Manufactured by the Detroit Piston Ring Co., 53-57 Richmond Ave., Detroit, Mich. Sales branch at 20 E. Jackson Blvd., Chicago, Ill. Price, \$1 each.

UNIVERSAL PULLER.

The Collison's Universal Puller is self-centering, working on the principle of a universal chuck. The jaws are either contracted or expanded to fit the work and when set are held rigidly in place. The puller is substantially built of drop forgings and steel castings and is guaranteed against imperfections in materials and workmanship. The puller complete has a capacity up to 17 inches and may be used for removing gears, flywheels, wrist pins, etc., or for straightening shafting.

Manufactured by George A. Collison, Burlington, Vt. Price complete with three sets of jaws, \$20. Special proposition for jobbers and dealers.

VICTROLENE.

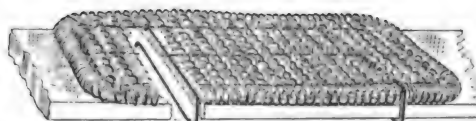
Victrolene is a scientifically compounded cleaner and polisher for automobiles. The manufacturers claim that it will remove all tar and road oil and restore the finish of the car to its original lustre; also that it will remove any rust that is on the nickel parts of the car. It may also be used to clean the leather upholstery and keep it soft and pliable.

Manufactured by Victrolene Co., 39 Pearl St., Boston. Prices from 25 cents for half pint can to \$3 for one gallon can.

VAPOR INSPIRATOR.

The Frog Vapor Inspirator is an ornamental emblem in the shape of a frog which is attached to the radiator cap and contains in its mouth an automatic valve that permits passage of air to the inside of the radiator. The overflow pipe is fitted with a water trap, and from this trap a pipe leads to the air intake of the carburetor. The circulation of air is through the frog, over the warm water in the radiator and to the carburetor. This circulation permits a certain amount of water vapor to enter the carburetor and the makers claim a better running engine.

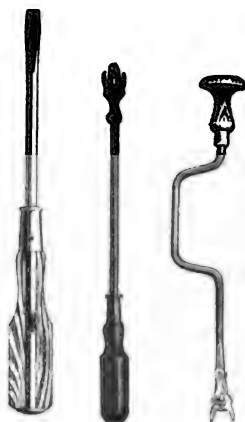
Distributed by H. & H. Specialty Co., Inc., 755 Boylston St., Boston, Mass.



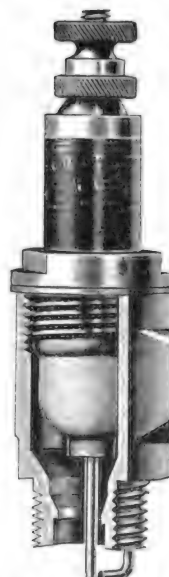
Running Board Mat.



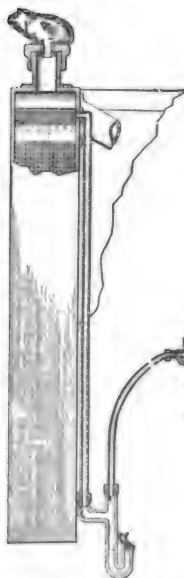
Collison's Universal Puller.



Three Novelty Auto Tools.



J. M. Soot-Proof Spark Plug.



Frog Vapor Inspirator.



Victrolene.

U-Kan-Plate Polish.

RUNNING BOARD MAT.

The Sanitary Wire Running Board Mat is made of galvanized steel wire, 9x18 inches dimensions, 7/8 inch thick. It clamps to the running board of the car and should last for years. Not only is it intended for removing dirt from the shoes, but also to insure a positive foothold when getting in or out of the car. A border around the mat affords a means for removing dirt, mud, etc., from the front of heel or side of shoe.

Manufactured by Sanitary Wire Door Mat Co., 1755 W. Van Buren St., Chicago, Ill. Price, \$1.25 each.

J. M. SOOT-PROOF PLUG.

Our illustration shows the construction of the J. M. Soot-Proof spark plug, which the makers claim is not only soot proof, but also free from short circuiting troubles. The petticoat forms a chamber between the porcelain and the body of the shell and also between the porcelain and the electrode. Expanding gas in these two chambers is said to exert a scouring effect upon the porcelain and to prevent the accumulation of carbon deposit.

Manufactured by the H. W. Johns Manville Co., New York City. Price, 75 cents.

AUTO TOOLS.

Three novelty tools are shown in the accompanying illustration. The first is the Insulelectric screw driver. The metal blade of this screw driver is insulated from the stud in the handle by an insulating plug. The next two cuts show the two types of adjustable valve grinder tools, which are designed to fit the valve tops of all makes of engines, whether slotted or drilled.

Manufactured by the M-B Tool Co., Providence, R. I. Prices upon request.

U-KAN-PLATE POLISH.

U-Kan-Plate polish is a combined silver plating polish for brass and copper and a cleaner for nickel plate. The makers claim that no mercury or acid is used in the manufacture of this polish and that it positively turns brass or copper finish to silver finish instantly by using it in the same manner as ordinary polish.

Manufactured by A. R. Justice Co., Inc., 612 Chestnut St., Philadelphia, Penn. Prices upon request.

Where and When You Can Find Boston Show Men.

If You Have Business with any of the Exhibitors Listed in This Tabulation You Can Locate Their Accredited Representatives Either at the Show or the Hotel or Other Address Given in the Lists.

CARS AND TRUCKS.

Apperson Bros. Auto Co.—Copley Plaza—T. E. Jarrad, vice-pres.

Atterbury Motor Car Co.—Lenox—W. A. Clare, gen. sales mgr.; E. C. Neal, treas.; M. R. Korshin, dist. sales mgr.; J. R. Coleman, chief engineer. Any time.

Autocar Sales and Service Co.—642 Beacon St.—D. S. Ludlum, pres.; H. M. Coale, sales mgr.; R. P. Page, Jr., Boston mgr.; C. L. Way, Boston supt. Any time.

Baker Motor Sales Co.—Copley Plaza and 400 Mass. Ave.—G. C. Gordon, pres.; R. H. Salmons, secy.; H. T. Boulden, sales mgr.; J. E. Morse, N. E. sales mgr.; J. S. Eyre, asst. N. E. sales manager; C. E. Collard, Philadelphia sales mgr.; L. D. Hallowell, N. Y., sales mgr. 9-5.

Baker, Day, Motor Truck Co.—Copley Plaza—Day Baker, pres. Any time.

Bowman Co., J. W.—Touraine—G. E. Daniels, pres. Any time.

Brewster Carriage Co.—Copley Plaza—Alan Buchanan, sales mgr. 10-10.

Chandler Motor Car Co.—714 Beacon St.—James Dunlap, sales mgr. 9-10.

Charles Motor Co.—Copley Square—V. A. Charles, pres.; J. R. Findlater, gen. sup. sales; R. L. DeLessir, east. dist. supt. 9-11 a. m., 10:30-12 p. m.

Chase, Inc., M. F.—Copley Plaza—E. S. Partridge, east. sales mgr. By appointment.

Commercial Car Unit Co.—Copley Plaza—G. M. Davis, sales mgr.; Mr. Hopkins, sales mgr., 148 Berkeley St. 10-12.

Davis Motor Car Co.—Copley Plaza and 162 Columbus Ave.—Walter C. Davis, factory rep.; F. Crow, prop.; B. P. Woodbury, mgr. 10:30-2.

Dart Motor Car Co.—Copley Plaza—J. D. Mansfield, sales mgr.; W. C. Chapman, field supt.; A. G. Gales, zone mgr.; H. Eastmen, zone mgr.; F. C. Petrie, zone mgr. Any time.

Duplex Truck Co.—Copley Plaza—H. M. Lee, pres.; R. W. Linscott, N. E. treas.; 708 Beacon St.; C. O. Canniff, sales dept. Copley Plaza.

General Engineering Co.—City Club—Abner Doble, vice pres. and gen. mgr.; T. P. Myers, sales mgr.; K. L. Moore, adv. mgr.; R. S. Lattin, A. F. C. Beckford, Chicago rep. Any time.

General Vehicle Co., Inc.—Copley Plaza—A. P. Bourquard, sales mgr.; G. H. Hudson, dist. mgr.; F. N. Carle, adv. mgr.

Hollier Motor Sales Co.—911 Boylston St.—N. W. Tompson, prop. 10-12.

Hudford Boston Co.—148 Berkeley St.—Geo. M. Proctor, treas.; Percy Ford, pres. 10-12.

Hurlburt Motor Truck Co.—Copley Plaza—W. B. Hurlburt, pres.; Mr. Walker, sales mgr.; Edward Wells, asst. gen. mgr.

Inter State Boston Co.—At Show—B. W. Twyman, gen. mgr. from factory; O. J. Vincent, mgr.; H. F. W. Rasmussen, wholesale mgr.

Jackson Motor Car Co.—Lenox Hotel—H. A. Matthews, pres.; A. H. Sowers, treas. and gen. mgr. 2-5, 8-10.

Jordan Motor Car Co.—Copley Plaza—Edward Jordan, pres.

Kelly-Springfield Motor Truck Co.—596 Commonwealth Ave.—Jas. L. Geddes, pres.; F. B. Hutchinson, sales mgr.; Lewis P. Kalb, chief engineer.

King Motors, Inc.—Copley Plaza—Art. Ward, Jr., pres.; T. E. A. Barthel, vice pres.; R. P. Bishop, sales mgr.; I. D. Rocap, tech. expert; G. H. Bates, com. mgr. Any time.

Krebs Commercial Car Co.—655 Beacon St.—J. C. Krebs, gen. mgr.

THESE lists contain all the information visitors at the Boston Automobile Show will need to locate the exhibitors they desire to do business with. The name of the company exhibiting is given first, in bold face type, followed by the name of the hotel or street address where their accredited representatives may be found. Next comes the names of the representatives, together with their official positions with their companies, and last the hours which they have reserved for visitors.

Lenox Motor Car Co.—889 Boylston St.—D. S. Howard, pres.; G. W. Gellier, treas. and gen. mgr.; R. B. Morton, eng.; N. T. Sears, pur. agent. 9-11 a. m.

Maxwell Motor Sales Corp.—Copley Plaza. 410 Newbury St. and 867 Boylston St.—T. J. Toner, sales dir.; Andrew E. Coburn, adv. mgr.; Hoover Holton, zone supt.; E. F. McConaha, Boston mgr.

Metropolitan Motors, Inc.—Lenox—Wm. C. Mack, pres.; L. F. Bond, treas. and gen. sales mgr.; J. C. Marley, secy. Any time.

Metz Co.—At Show—C. E. Metz, pres.; Roscoe Pickens, sales mgr. Any time.

Middlesex Motor Car Co.—709 Beacon St.—Herbert L. Legg, pres.; Alleston D. Walker, treas.

Morse & Co., A. C.—705 Beacon St.—A. C. Morse, mgr. 11-10:30.

Oakland Motor Co. of N. E.—655 Beacon St.—L. B. Sanders, gen. mgr.; C. R. Dunbar, pres.; W. H. Watson, gen. sales mgr.

Oldsmobile Co. of N. E.—Copley Plaza—J. J. MacGregor, gen. mgr.; C. L. Lowd, asst. gen. mgr. Any time.

Olds Motor Works—Copley Plaza—E. VerLinden, gen. mgr.; P. L. VerLinden, sales mgr. Any time.

Page Co., Charles H.—Copley Plaza—Carl H. Page.

Paige Motor Co. of Boston—Lenox—E. E. Skeetop, N. E. Mgr.; Harvey Stewart, N. Y. mgr.; Mr. McCormick, factory rep.

Reilly Motors Sales Co.—1008 Boylston St.—Chas. J. Reilly, pres.; A. W. Brown, dir.; Miss K. C. Ahern, treas.; F. S. Coe, dir. 9-9 p. m.

Russell Co., The W. L.—At Show—W. L. Russell, pres.; Geo. R. Armstrong, treas.

Scripps-Booth Motor Car Co.—618 Commonwealth Ave.—A. Vere Shaw, mgr.; Clifford L. Donald, asst. mgr.; Leon M. Severance, ser. mgr.

Scripps-Booth Corp.—Copley Square—Robert LaPorte, east. dist. mgr.; A. R. Goodman, trav. rep.

Shauck & MacMurray Co.—793 Boylston St.—T. E. Jarrard, R. W. Shauck, treas.; J. G. MacMurray, pres.

Sheridan Light Truck Co. of N. E.—18 Tremont St. and 60 State St.—H. R. Sanders, Frank H. Jones, Earl I. Cushing. 9-5.

Signal Motor Truck Co.—949 Commonwealth Ave.—John Squires, eng.; Fred C. Henderson, pres.; Chas. C. Black. John Tuttle, Mr. Ratcliffe, Curtis Mercer, Geo. Baker, sales dept.; H. Walton, east. rep. 8-10.

Smith Co., Fred S.—Copley Plaza—Geo. H. Smith, Mercer sales mgr.; Marcus I. Brock, American sales mgr. Wed. and Thurs.

Standard Automobile Co. of N. E.—908 Boylston St.—Charles W. Lewis, treas.; R. W. Vining, mgr.

Stanley Motor Carriage Co.—At Show—Prescott Warren, vice pres. and sales mgr.; E. M. Hallett, sec. and gen. mgr. 8:30-6.

Studebaker Corp. of Amer.—Copley Plaza—L. J. Ollier, vice pres.; H. T. Myers, com. car sales mgr.

Troy Wagon Works—Parker House—C. H. Queredux, N. Y. mgr.

H. S. Waite Co.—Copley Plaza—Geo. B. Waite, gen. sales mgr.; R. R. Hall, east. sales export mgr.

White Co., The—Lenox and Copley Plaza—Walter C. White, vice pres.; F. H. Squires, dept. mgr.; James A. Harris, Jr., adv. dept.; M. H. Newton, asst. adv. mgr.

Winton Co., The—At Show—O. F. Baughman, sales mgr.; R. A. Partridge, Maine agent; J. A. Foster, R. I. agent; Walter P. Pierce, R. I. agent; H. W. Eager, N. H. agent; G. D. Graves, Conn. agent.

Woods Mobilette Co. of N. E.—18 Tremont St. and 60 State St.—H. R. Sanders, Frank H. Jones, Earl I. Cushing. 9-5.

ACCESSORIES.

The Aerofram Co., Inc.—107 Mass. Ave.—J. S. Spargo, pres.; Wm. A. Bancroft, treas.; Chas. M. Foster, N. E. sales agent. 9-12 to 1-5.

Albany Lubricating Co.—At Show—William D. Naughton, N. E. rep.

Allen Engineering Co.—60 High St.—Ernest B. Allen, prop.; Frank J. Healy, salesman; Robert E. Apthorp, salesman. 9-5.

American Bureau of Engineering—Tech. Chambers—C. J. Buckwalter, gen. mgr.; H. L. Lancaster, N. E. mgr.

American Storage Battery Co.—At Show—H. S. Wilkins, J. R. Taylor, M. C. Harrington, C. H. Monahan. 9-10.

Automatic Time Stamp Co., The—At Show—Robert H. Thompson, sales mgr. Any time.

Automobile Legal Association—At Show—A. A. Wartel, Springfield mgr.; W. C. Grabe, Providence mgr.; A. A. Stinson, New Haven, mgr.

Automobile Mutual Liability Ins. Co.—At Show—A. Shirley Ladd, sec.; David F. Butler, asst. sec.; Charles B. Grose, inspector; William L. Blosson, inspector; Henry R. Burbeck, adjustor. Any time.

Barnstead Still and Sterilizer Co.—At Show—S. G. Barnstead, vice pres.

Bigelow-Dowse Co.—229 Franklin St.—J. F. Miller, pur. agent; R. Cutter, E. C. Crane, H. B. Foster, salesmen. 9-3.

Black & Decker Mfg. Co.—At Show—S. Ducan Black, pres. 10-10.

Bolce Motor Equipment Co.—76 Brookline Ave.—B. S. Newman, W. S. Bolce, pres.; H. F. Hynes, H. E. Neal.

Bolce-Perrine Co.—Copley Square—Lester Perrine, pres. and gen. mgr.; John A. Sturdevant, sales mgr.; Russel E. White and W. E. Crosscup, salesmen. By appointment.

Brooks-Skinner Co., Inc.—At Show—Harold Brooks, pres. and gen. mgr.; Thomas Skinner, supt.; Edward C. Hunt, salesman. Any time.

Bunnell Co., The—At Show—H. A. Konderman, pres. and gen. mgr. Any time.

Burd Ring Sales Co.—At Show—W. T. Rogers, pres.; H. H. Cobe, N. E. mgr.; L. E. Moore, salesman; E. G. Adams, salesman.

Burrill Tire Tool Co.—At Show—F. H. Burrill, pres.; G. H. Brown, salesman.

Caldwell, John—280 Chambers Ave.—John Caldwell, John O. Caldwell, Sam Selig.
Champion Spark Plug Co.—Copley Plaza—B. A. Stranahan, pres.; F. D. Stranahan, treas.; F. B. Caswell, sales mgr.; Geo. B. Nason and H. L. Carey, adv. dept.
Connell Co., W. J.—At Show—Henry Cramp, Howard Green and C. J. Gadsly, salesmen.
Contractors' Mutual Liability Ins. Co.—At Show—A. B. Cole, chief inspector; C. A. Foster, inspector; Wm. M. Burche, sec.
Craig-Wyman Co.—At Show—R. F. Craig, pres.; Arnold M. Wyman, treas.
Cut Price Auto Supply Co.—563 Boylston St.—P. B. Goldberg, treas. and mgr.; Murray S. Cohen, pres. and asst. mgr. 8-6.
Samuel R. Dexter Co.—107 Massachusetts Ave.—J. B. Rush, S. R. Dexter. 8:30-5.
Dyer Company, G. H.—At Show—L. W. Blake, R. Hilt.
Eagle Oil Supply Co.—At Show—C. N. Goward, treas.; J. E. Doleman, office mgr.; J. A. Morehouse, sales mgr.; B. F. Waggott.
Eastern Oil Tank Co.—At Show—Charles E. Gee, prop.
Economiser and Supply Co.—At Show—Walter S. Jefferson, N. Y. gen. mgr.; I. Henry, A. J. Coburn, Boston gen. mgr.
Empire Axle Co.—Copley-Plaza—R. W. Foley, sales mgr.; W. C. Blackham, sec. and treas.; E. de H. Caldwell, vice pres. and chief engr.
Fernald Shock Absorbing Suspension Co.—179 Summer St.—C. G. Fernald, John C. Hutton.
Ernst Flentje—At Show—Ernst Flentje, prop.
Fuller Brush Co., Inc.—320 Devonshire St.—A. C. Fuller, pres.; S. L. Metcalf, sales mgr.; M. E. Northrop, dist. mgr.; E. Hodge, salesman. 9-5.
General Appliance Co.—127 Federal St.—Geo. W. Boynton, pres. and gen. mgr.; A. E. Gorham, Raymond S. Pinkham,

James B. Shaw, salesmen. 9-5.
Guaranteed Magneto Parts Corp.—A. S. Hecht, pres.; D. N. Marshank, gen. mgr.
Holland Trailer Car Co.—At Show—Charles S. Holland, pres.; J. Gage, sales mgr.; Russell E. Hunt, prop.
Holt & Beebe Co.—At Show—W. J. H. Beebe, Frank J. Beebe.
Justice, A. R.—At Show—F. Justice, pres.; John Doolan, salesman.
Lang Engineering Co., J. S.—5 Park Square—Henry J. Perry, treas.; James S. Lang, pres. By appointment.
Lebanon Machine Co.—Thos. F. Dwyer, vice pres., Hotel Avery; C. P. Butler, gen. mgr., Adams House; Paul C. Smith, spec. rep., Hotel Avery.
Malton Specialty Co.—At Show—W. C. Malton, pres.; M. C. Malton, treas.; Percy Ford.
Martin Rocking Fifth Wheel Co.—Copley Square—C. Martin, pres. By appointment.
Mass. Mutual Automobile Ins. Co.—At Show—A. Shirley Ladd, sec.; Paul W. Conant, asst. sec.; William L. Blossom, inspector; Henry R. Burbeck, adjuster.
Mead Morrison Mfg. Co.—C. E. Robinson, sales engineer.
Miller Carburetor Sales Co. of N. E.—80 Brookline Ave.—Joseph M. Curley, treas.; E. L. Smith, pres. 8:30-11.
Mitchell & Smith, Inc.—At Show—F. Robins Mitchell, pres. and treas.; G. W. Lawrie, vice pres.; H. E. Pender, ser. mgr.
Motor Accessories, Inc.—At Show—L. Arthur Watkins, pres.; Frank J. Carberry, salesman; James J. Mahoney, salesman.
New England Equipment Co.—45 Milk St.—Gordon B. Sawyer, mgr.; Joseph G. Corey, C. E. Blanchard and C. A. Webb, salesmen.
New Lubricating Oil Co.—At Show—C. G. Stowe, factory rep.; W. W. Haskell, Boston mgr.; H. H. Pease, Portland mgr.; W. B. Shedd, N. Y. treas.; J. F. Tibbitts, Boston salesman.
Nutter Electric Equipment Co.—At Show—Emanuel Gerfinkle, sales mgr.

Optimus Mfg. Co., Inc.—At Show—J. Stewart, pres.; Frank A. Reinhard, treas.; Walter G. Costello, rep.
Pettingill-Andrews Co.—At Show—W. E. Phinney, mgr. spec. dept.; R. J. Brown
Pressure Proof Piston Ring Co.—169 Mass. Ave.—Lewis C. Marshall, pres.; Charles L. Case, treas.; H. C. Small, secy. 1-5.
Presto Cloth Mfg. Co.—Copley Square—Victor H. Christer. 11-11.
Rand Reflector Co.—107 Mass. Ave.—Frank B. Rand, pres.; Howard B. Rand, treas. 9-5.
Sexton Oil Co.—Copley-Plaza—C. Howard Williams, sales mgr.; Mr. Moore, gen. mgr.
The Selvex Co.—Copley Square—G. W. Dennis, ter. mgr.; Chas. L. Lamton, salesman.
Shaw Propeller Co.—At Show—Edward Richardson, pres.; Wm. H. Griffith, supt. of factory; Alfred B. Lord, sales mgr.
Stanley Insulating Co.—Young's Hotel—L. L. Jenkins, salesman; J. J. Newton, cashier.
M. B. Tool Co.—At Show—J. J. Banigan, sec.; L. S. Massicotte, mgr.
United Chemical Co.—Copley Square—V. A. Charles, treas.; B. E. Stearns, chemist; N. F. Darling, salesman.
United States Rubber Co.—At Show—Boston Branch, W. T. Maybury, R. B. Lindsay, Edward Cadets, Geo. H. Bailey, Roy Nafis, representatives.
U-Sav-Your Mfg. Co.—At Show—B. D. Perkins, mgr.; Fred Perkins, B. M. Covell, Charles B. Ryan and Fred Allen, salesmen.
Vietrolene Co.—At Show—Edward W. Pope, Frank H. Bosson.
White & Bagley Co.—Copley Plaza—H. P. Bagley, pres. and treas.; P. W. Corey, spec. rep.; J. T. Leroy and T. H. Day, salesmen.
White, Virgil D.—Castle Square—Virgil D. White, mgr.
Wilson, John V.—At Show—J. V. Wilson, gen. mgr.; F. S. Evans, spec. rep.
Wright "Name On" Robe Co.—At Show—John M. Wright, M. J. Wright.

Metz Has Special Exhibit At Boston Show

With a force of about 70 sales people to attend to visitors at its special exhibition booth at the Boston Automobile Show, the Metz Company of Waltham, Mass., will make a big effort to convince people that New England still stands supreme in the production of fine motor cars. The company contracted for a spe-

cial space at the show, dubbing it Metz Hall, and here will be displayed the full Metz line of pleasure cars and the new \$695 high duty one-ton truck.

Invitations were sent to more than 100,000 motorists in New England to visit Metz hall and meet Roscoe A. Pickens, the manager of the huge Metz company. In addition to the special show display the big Metz factory at Waltham, which is within a short ride of Boston, is to be thrown open to visitors so that they may see at first hand how an automobile is made. The Metz plant, including four large factories, is the largest in the East, that is east of the Alleghenies, and is said to be the most completely equipped in the world. Everything that enters into the construction of the Metz car is made there.

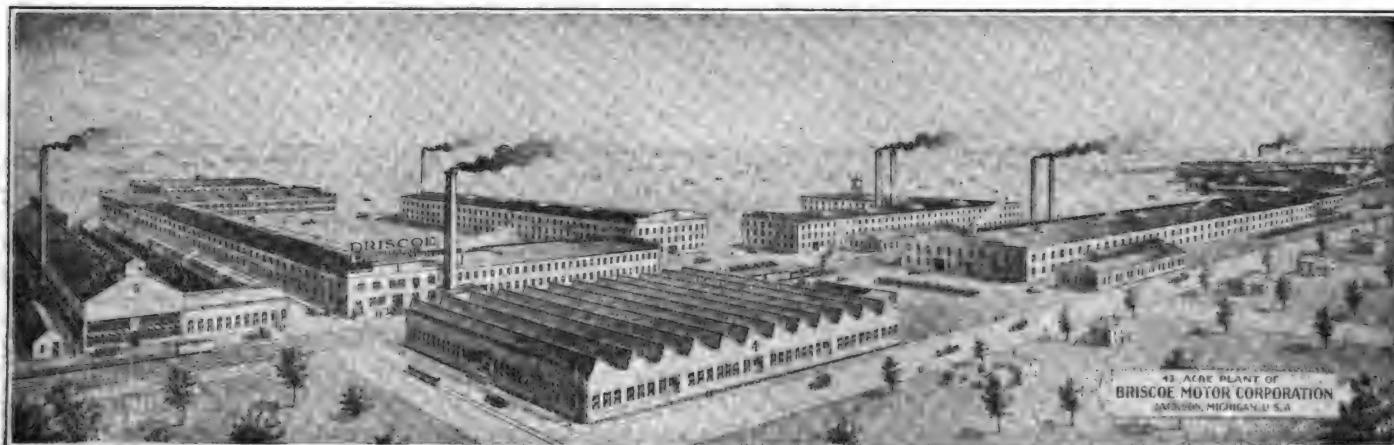
In speaking of the exhibit at the show Manager Pickens said: "The display will prove a revelation to many. The cars made by New England craftsmanship are not excelled anywhere. It is well known that the mechanics of the six northeastern states are of a higher order and that their work in every line is of a superior quality. That is why the Metz car has made such a name for itself, why it took first, second and third places in the last Glidden tour against the best machines of the world, and why sturdiness, simplicity, economy and long life are terms applied to it by owners.

NEW TYPE CAR IN MODERN WARFARE.

THE new Monautos recently brought out promise to create a new field for their use, although they have been upon the market but a short time. Recently a soldier, equipped with a heavy marching outfit, making a total weight of 300 pounds, tried out one of these machines, which weigh only 50 pounds, and attained a speed of 25 miles an hour. He took a course across rough ground that was impassable to either automobiles or horses. It is claimed that these cars can be run 50 miles on 10 cents worth of fuel. An army mounted on these machines could be maneuvered with great rapidity and at the same time each soldier could use it as a barricade in action.



Roscoe A. Pickens, Manager of the Metz Co. of Waltham, Mass.



Where Briscoe Cars Are Made. 1—General Offices and Engine Mfg. Plant; 2—Service Plant; 3—Body Plant; 4—Gear and Special Machinery Plant; 5—Forge and Heat Treating Plant; 6—Engine Testing Plant; 7—Engine Assembly Plant; 8—Laboratory; 9—Final Assembly, Painting and Top Mfg. Plant; 10—Cams and Crankshaft Plant.

The Business Side of the Motor Vehicle Industry

The Briscoe Motor Corp. has established on a site of 43 acres at Jackson, Mich., one of the largest plants in the world devoted exclusively to the manufacture of automobiles. It consists of 10 separate factory buildings as follows: General offices and motor manufacturing plant, services plant, body plant, gear and special machinery plant, forge and heat treating plant, motor testing plant, motor assembly plant, laboratory, final assembly painting and top manufacturing plant and cam and crankshaft plant. One of the largest additions was made last year with the acquisition of the plant of the Fuller Buggy Co., which has been turned into a modern and up-to-date assembly factory. The second floor of the building is used for upholstering and finishing the bodies, which are made complete by the company, including cushions, bows, springs and other parts entering into the production of a complete car.

The Republic Motor Truck Co., Alma, Mich., is arranging for an increase in its capital stock from 62,500 shares to 100,000 shares. The stockholders will be asked to sanction the increase at the annual meeting to be held on Feb. 28.

The Hydraulic Pressed Steel Co., Cleveland, O., has declared a stock dividend of

125 per cent. to holders of common stock. There is at present outstanding \$1,000,000 preferred stock and \$1,500,000 common stock. It is planned to increase the issue of common to \$4,500,000, \$1,875,000 covering the 125 per cent. stock dividend and \$875,000 to finance the recent purchase of the Cleveland Welding & Mfg. Co. The remaining \$250,000 of the issue would remain in the treasury.

J. A. White, formerly manager of the Boston and Chicago branch of the U. S. Light & Heat Corp., has been appointed manager of sales with battery department with headquarters at the factory at Niagara Falls, N. Y.

W. W. Halsey has been appointed manager of the New York office of the U. S. Light & Heat Corp.

The Slocum, Avram & Slocum Laboratories, operating one of the largest machine shops in New York City, at 531 West 21st street, with several subsidiary companies, have established an automobile department for the purpose of manufacturing and selling on a royalty basis any automobile device which meets with the approval of their engineers.

Tom Marshall has been appointed sales manager of the Stutz Motor Car Co., Indianapolis, Ind.

T. S. Gamble has become associated with the advertising firm of Benson, Campbell & Slaton as manager of the company's office at Cleveland, O. He was formerly assistant sales manager for the Maxwell Motor Sales Corp., Detroit.

The Kent Motors Corp., Newark, N. J., has appointed William Nantarro superintendent of the body building department. Mr. Nantarro was formerly with J. M. Quimby & Co., the well known body makers of Newark.

E. B. McKay has been elected a director, vice president and sales manager of the Empire Tire and Rubber Corp., Trenton, N. J. He was formerly manager of the company's branch at Chicago.

The C. R. Wilson Body Co., Detroit, Mich., has added 80,000 square feet of space to its manufacturing facilities by the purchase of the plant of the Hargraves Mfg. Co. in that city.

George M. Graham, formerly with the Willys-Overland Co. and one of the best known figures in the automobile trade, has been appointed assistant commercial manager of the Pierce-Arrow Motor Car Co., Buffalo, N. Y., and will be directly associated with Commercial Manager W. J. Foss in marketing the pleasure cars and trucks. Before he joined the Willys-Overland organization he was engaged in sales promotion work for the Pierce-Arrow company in the territory from St. Louis east and south from Boston.

W. A. Bryan has been appointed master

mechanic of the Firestone Tire & Rubber Co., Akron, O. He was formerly superintendent of the International Harvester Corporation's Akron branch.

The Sexton Oil Co., dealers in castor oil for engine lubrication, will establish factory branches in Chicago, Boston, Cleveland, New York, Albany, Omaha, Memphis, Los Angeles, Charleston and Savannah.

R. F. Monroe, son of R. O. Monroe, president of the Monroe Motor Co., has been appointed manager of the company's sales in the Middle West, with headquarters at South Bend, Ind.

The Michigan Copper & Brass Co., Detroit, Mich., will expend \$200,000 for expansion to take care of the increased business, orders having been booked for 20,000,000 pounds of product. During the past year the company earned \$972,494.75, which is equal to 87 per cent. on the outstanding capital stock. The dividends during the year included a stock dividend of 125 per cent. and totaled in all \$720,760. The present surplus is \$844,411.87, or equivalent to 80 per cent. of the total capital. At the annual meeting the following officers were elected: President, D. M. Ireland; first vice president, J. J. Whitehead; second vice president, H. H. Smith; secretary, A. L. Simmons; treas-



George H. Graham, Assistant Commercial Manager of Pierce-Arrow Motor Car Co. Recently with Overland.



E. A. DeLaruelle of Milwaukee, Recently Elected President of the American Association of Garage Owners.



The Plant of the Torbensen Axle Co., Manufacturer of Torbensen-Drive Axles, at Cleveland, with the Additions Now Nearing Completion—The Company Claims to Be the Largest Axle Manufacturer of the World.

urer, John S. Connell; directors, C. S. Mott, A. P. Sloan, W. P. Chrysler, B. G. Goether, J. H. Mallory, E. C. McCrone, D. M. Ireland, H. H. Smith, J. J. Whitehead.

The Batavia Rubber Co., Batavia, N. Y., has made arrangements for the purchase of the property, patent rights and agreements of the Simplex Rubber Co. of America, Ossining, N. Y., which has been manufacturing under patents granted by the Simplex Rubber Co. of England. When the merger is effected the Batavia company will add a solid tire product to their line and also other rubber products that are not at present being manufactured.

The Batavia Rubber Co. will increase its capital stock \$195,000, which issue will be used to take over the Simplex shares and will also assume notes amounting to \$50,000 which the latter company has outstanding.

The Dodge Bros., Detroit, Mich., are planning the manufacture of a light delivery car, according to reports emanating from that city.

The Porter Body Co., Ypsilanti, Mich., has been incorporated with a capital of \$30,000 to succeed the Globe Truck Co. in the manufacture of automobile parts. The officers of the new company are: President, David Killins; vice president, G. E. Roiter; treasurer, G. Killins; secretary, B. Killins.

The National Tire & Rubber Co., East Palestine, O., will be transferred in its entirety to a new corporation to be organized under the laws of that state with an authorized capital of \$1,000,000.

The Goodyear Tire & Rubber Co., Akron, O., it is reported, will take over the plant of the Kelly-Springfield Tire Co. when the latter company moves to its new plant at Cumberland, Md.

The Manufacturers Production Co., Dayton, O., has sold its plant in that city to

the Maxwell Motor Co., Inc. It will be used for the manufacture of bodies and makes the third plant owned by the latter corporation in Dayton.

The All Season Body Co., Detroit, Mich., has been incorporated with capital of \$500,000 to engage in the manufacture of automobile bodies. The company will take over the plant of the Page Bros. Buggy Co., at Marshall, Mich., and will start work as soon as possible on an order for 5000 bodies recently received from the Briscoe Motor Corp. The officers of the new company are: President, W. L. Page; vice president, J. A. McAvoy; secretary, E. E. Page; treasurer, W. J. Dibble.

The Perfection Coil Spring Co., Jackson, Mich., has increased its capital from \$20,000 to \$100,000.

Gould Allen, formerly sales manager of the Colbert Gear Co., Lockport, N. Y., has joined the sales organization of the Republic Motor Truck Co., Alma, Mich.

The Hoover Steel Ball Co., Ann Arbor, Mich., earned \$1,310,000 gross as compared with \$493,000 in 1915 and 163,000 in 1914.

The Saginaw Malleable Iron Co., Saginaw, Mich., recently incorporated, has increased its capital from \$350,000 to \$400,000, divided into \$250,000 common and \$150,000 preferred. The officers of the company are: President, C. F. Drozeski; vice president, W. J. Wickes; secretary, J. Kirby; treasurer, G. H. Hannum; board of directors, W. J. Wickes, J. J. Kerns, C. T. Kerry, H. T. Robinson, C. F. Drozeski, E. J. Lobdell.

T. P. Myers, sales manager of the General Engineering Co., Detroit, Mich., who manufacture the Doble steam car, has been elected to the board of directors.

C. E. Cook, formerly Pacific Coast manager of the B. F. Goodrich Co., Akron, O.,

has been made a member of the executive staff of the company, with headquarters at the factory. He is succeeded on the Pacific Coast by Frank R. Carroll, who was formerly manager of the Los Angeles branch.

O. E. Stoll, formerly branch manager for the General Motor Truck Co. at Philadelphia, has been appointed sales manager to succeed W. K. Chilcott.

The Hudson Motor Car Co., Detroit, Mich., is installing a small amount of equipment for the manufacture of shells to fill a small order received from the government. The order was given for the purpose of training the company's mechanics in case war was declared.

William N. Thompson has been elected treasurer and general manager of the Stutz Motor Car Co., Indianapolis, Ind., to succeed the late Henry F. Campbell, who retired. Mr. Thompson was formerly sales manager of the company. He will be succeeded by Thomas Marshall, formerly with the Willys-Overland Co.

Frank Blanchard, sales manager of the Firestone Tire & Rubber Co., Akron, O., died Monday, Feb. 5, as a result of a surgical operation.

The Ionia Auto Body Co., Grand Rapids, Mich., has acquired one of the Heinz pickle company's plants, which will be used for their manufacturing operations. The plant cost \$85,000.

The Duesenberg Motor Co., Chicago, Ill., is said to be negotiating for a large tract of land near Newark, N. J., which will be used for the erection of a new and larger manufacturing plant.

The American Motors Corp., Plainfield, N. J., has started production in its plant in that city. W. H. Crowley will have charge of sales in New York and Pennsylvania and C. W. Govan in New England and on Long Island. H. M. Applegate is in charge of the advertising.

The Grant-Lees Gear Co., Cleveland, O., will occupy its new factory on or about March 1. The new addition is of concrete and steel construction, three stories in height and will provide 30,000 more square feet of floor space.

The Marvel Accessories Mfg. Co., Cleveland, O., has moved into its new building in that city at the corner of St. Clair avenue and East 73d street. The new plant is equipped throughout with the latest manufacturing facilities and the production capacity has been increased 500 per cent. The building is of brick construction of the newest design and is most artistic in color. It is what is commonly called a "daylight factory," owing to the liberal use of glass on all sides. Every comfort and convenience has been provided for the employees, fully equipped rest room and lunch room being maintained.

The Ford Motor Co., Detroit, Mich., has



The New Daylight Plant of Marvel Accessories Mfg. Co., Located in Cleveland, O.

started work on its new plant at Kearney, N. J., which will be used for the assembly and finishing of cars for the eastern domestic and foreign trade. The new structure, which will be completed within a year, will be four stories in height.

The Remy Electric Co. has established a new service station in Baltimore, Md., in the sales rooms of the Reus Bros.

C. F. Wolfe, formerly manager of the Remy Electric Co.'s service station at Buffalo, has been transferred to the New Orleans service station.

The Chandler Motor Car Co., Cleveland, O., for the year ending Dec. 1, 1916, earned a net profit of \$1,716,166 and paid cash dividends of \$700,000, or 10 per cent. on its capital stock. The balance of \$1,016,166 was added to the surplus. It was stated at the annual meeting that orders already booked for 1917 delivery are 50 per cent. greater than the entire production in 1916.

The Miller Rubber Co., Akron, O., made gross earnings for the 15 months ending Dec. 31, 1916, of \$7,583,605.95, as compared with \$3,216,000 for the year ending Oct. 1, 1915. The surplus earnings for the fiscal year of 1915 were \$831,746.99, as compared with \$952,952 for the 15 months ending Dec. 31, 1916.

Eddie Rickenbacher, the well known racing driver, has returned from England, where he went at the end of the racing season to place an order for two Sunbeam racing cars. The new cars, according to Rickenbacher, will have engines of 200 cubic inch displacement, will develop 150 horsepower and have a speed of better than 120 miles an hour.

The Mitchell Motors Co., Racine, Wis., for the year ending Oct. 31, 1916, report net earnings of \$1,188,398 and a surplus of \$361,618 after paying dividends and all charges.

The Olympian Motor Co., Pontiac, Mich., has doubled its capital to \$2,000,000.

W. B. Cochran has been appointed manager of the Pacific Coast business of the General Motors Truck Co. of Pontiac, Mich.

R. D. Hawley, manager of the Studebaker branch at Columbus, O., gave a dinner recently to about 60 Studebaker dealers in that state. J. C. Hahn, treasurer of the Studebaker Sales Co., and C. E. Dean, general sales manager, spoke at the dinner, which was held in the Chittendon hotel.

The Viator Rubber Co., Springfield, O., is planning an addition to its plant that will double the floor space. The company's manufacturing operations have been continued day and night for over two years. The annual election of the company, held recently, resulted as follows: President, H. H. Durr; treasurer and general manager, F. R. Talbott; secretary, Arthur Sackett; vice president, H. J. Robben; assistant general manager, C. A. Swinehart. These officers, together with Ben Johnson and John L. Bushnell, comprise the directorate.

The Buchan Auto Supply Co., Mansfield, O., has been incorporated with a capital of \$10,000. G. L. Buchan is sales manager of the company.

The La Crosse Tractor Co., La Crosse, Wis., has leased the former plant of the Summit Stove Works in that city, where it will manufacture the Happy Farmer tractor. This year's production schedule calls for 2800 machines.

The Belmore Motor Car Co., Toledo, O., is introducing a series of light six and four-cylinder pleasure cars with various body types.

The Harroun Motors Co., Detroit, Mich., has signed contracts with the following distributors: Wetmore & Quinn, Detroit, Mich.; Mark-Roberts Motor Co., Seattle, Wash.; Lord Motor Car Co., Lincoln, Neb.; Southern Motors Corp., El Paso, Tex.; Buxton-Phillips Motor Car Corp., Kansas City, Mo.

The Automobile Mechanics Corp., New York City, has acquired the Abbott-Detroit Parts Corp. and the Marion Auto Service Co., and will maintain a service station and headquarters at 221 West Fifty-third street, in New York. The company will also maintain Elcar and

Pullman service in the eastern part of the country.

The Crowther Motor Co., Rochester, N. Y., manufacturers of the Crowther-Durycar, which has a roller drive, has been placed in the hands of receivers. The bankruptcy was involuntary, but it is understood that it is of a friendly nature and the steps were taken to tide the concern over until additional capital is secured.

The Briggs & Stratton Co., Milwaukee, Wis., manufacturers of electrical equipment, have increased their capital from \$50,000 to \$250,000. The company is erecting a new plant at a cost of \$100,000.

The Bimel Spoke & Auto Wheel Co., Portland, Ind., has issued \$50,000 preferred stock, increasing its capitalization by that amount.

The Pierce-Arrow Motor Car Co., Buffalo, N. Y., is expected to make application to the governors of the New York Stock Exchange to have the company's shares listed. The outstanding securities of the company include an issue of 100,000 shares of eight per cent. cumulative preferred stock, par value \$100, and 250,000 shares of common stock of no par value.

The Prest-O-Lite Co., Inc., has appointed the following firms as battery service stations: Dinges-Shank-Smith Co., Huntington, W. Va.; F. A. Albrecht, Janesville, Wis.; Standard Automobile Co., Wheeling, W. Va.; Gilbert & Sons, Osborne, Kan.; T. J. Butler, Harrison, N. J.; The Shuyler Rubber & Supply Co., New Orleans, La.; Baker & Oxner, Newberry, S. C.; Taylor & Slick, Clinton, Ill.

The Grus Leaf Spring Oiler Co., formerly at 1536 Michigan avenue, Chicago, has moved to 625 W. Jackson boulevard, where the quarters are larger and additional manufacturing facilities are available. The company is also manufacturing the Grus Quick Change Chain and will introduce several accessory novelties in the near future.

The Columbia Motors Co., Detroit, Mich., has plans for the erection of a new and modern plant which will be equipped with the latest labor saving machinery and devices. Each department will be laid out in accordance with the best efficiency practices and it will be located where unexcelled railroad facilities are afforded.

The Canadian S K F Co., Ltd., has been organized with a Canadian charter to manufacture and sell S K F self-aligning ball bearings in the Dominion. Headquarters have been established in Toronto at 47 King street, West.

The Federal Motor Truck Co., Detroit, Mich., reports total sales for the fiscal year ending Dec. 31, 1916, of \$4,261,009, an increase of \$1,807,503 over 1915. The net profits for the year were \$680,615. The balance sheet shows cash amounting to

\$121,426 as against \$23,936 in 1915, and accounts receivable of \$573,496, as compared with \$214,202 in 1915, and a profit and loss surplus of \$872,100.

The Redden Motor Truck Co., recently incorporated under the laws of New York to manufacture the Redden truck maker under the Cook patents, will have 20 branches in the largest cities of the country. The company's capital will be divided into 200,000 shares of no par value. The new company is organized on a basis of approximately \$4,000,000 capitalization. The headquarters of the company will be in Chicago, where it is expected the main factory will be located. It is possible, however, that either Joliet, Ill., or Jackson, Mich., might be selected as the location for the main plant.

The Northwestern Chemical Co., Marietta, O., held a business convention at its new offices in that city on Jan. 20-24 inclusive, which was attended by all the company's sales representatives from all over the country. General Manager F. R. Hall opened the first day's session with an address of greeting, after which he appointed the various committees to have charge of the subjects that were to come up for discussion.

After a thorough discussion of the various articles included in the "Chemically Correct" line, the company's chief chemist explained each one of the products. James P. Hunting of the Singleton-Hunting Co., explained the national advertising campaign for the coming year and each salesman was presented with a loose-leaf book containing proof sheets of the 79 separate advertisements to be used by the company during 1917 and a facsimile of the written acknowledgment of the order given to each published by the Northwestern Chemical Co. Samples of the other advertising matter to be used was also distributed among the salesmen.

The convention concluded with a banquet and entertainment, which was arranged by V. V. Casey. Those present were: G. Sam Scott, V. V. Casey, I. D. Cross, M. P. McGee, L. D. Speed, C. B. Ballard, C. J. La Vallee, J. H. Rennard, G. A. Le Valle, John McCoy, F. R. Hall, B. H. Barker, H. A. Fordham, P. L. Riemann, R. M. Tussing and James P. Hunting.

The Du Pont Fabrikoid Co., Wilmington, Del., has purchased the Marokene Co., Elizabeth, N. J., which manufactures a material similar to fabrikoid and is used extensively by the automobile, carriage and upholstery industries. R. B. Heyward, who has been assistant superintendent of the Du Pont's company's Newburg plant, will become superintendent and all sales will be under the direction of J. K. Rogers, sales manager of the Du Pont Fabrikoid Co.



Sales Representatives of the Northwestern Chemical Co., Who Attended the Business Meeting Held at the Company's Factory at Marietta, O.



AUTOMOBILE LATHE.

(Figure 313.)

Our illustration shows a novel, three-speed, wood turning lathe. The rear wheel of an automobile is jacked up and a strong block is placed under the axle to form a firm support; the other wheel is fixed so that it will not turn. A wheel thus arranged forms a three-speed head for the lathe. A spare hub cap should be taken to a machinist and fitted with either a sharp flat point or a drill chuck. It is necessary, of course, that the point or chuck be mounted in the centre of the hub cap. A chuck would be the most convenient fitting, because it could be used to hold drills, spindles or arbors the same as an ordinary lathe drill chuck is used. The illustration shows a flat point, however. If a chuck is used the flat point is placed in the jaws.

The tail of the lathe is made up of a heavy piece of wrought iron about $\frac{1}{2}$ inch thick and two inches wide, into which is screwed a $\frac{5}{8}$ inch pointed set screw. This piece of iron is firmly bolted to a wood block high enough to bring the point of the set screw on a line with the centre of the point, or chuck, mounted on the hub cap of the automobile; the whole is firmly bolted to the floor and reinforced by angle irons. The tool rest may be made of wood and may be movable, such as is used on an ordinary carpenter's wood turning lathe.

The distance between the head and tail of this lathe is limited only by the width of the garage. Such a lathe will be found very useful for wood turning, boring holes, polishing round pieces of metal, rough metal turning, and, by mounting an emery wheel on a wood arbor, for grinding.

A HANDY CREEPER.

(Figure 315.)

Four boards, three table casters and a few screws form the component parts for a useful creeper for getting under the automobile without a pit. While very crude and cheap it answers the purpose.

Five or six-inch lengths of broken hacksaws may be bolted into a piece of wood, which serves as a handle, and used for light work. This tool, while incapable of withstanding much strain, may be used in corners and places where a hacksaw frame cannot be utilized.

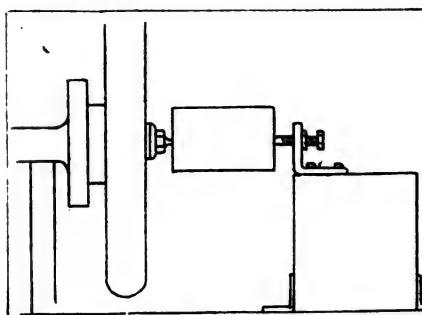


Fig. 313—Illustrating an Automobile Lathe.

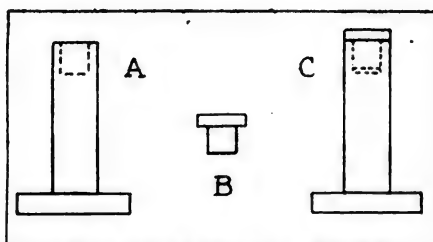


Fig. 314—Adjustable Tappets.

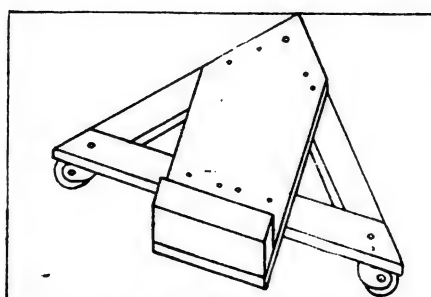


Fig. 315—Home Made Creeper.

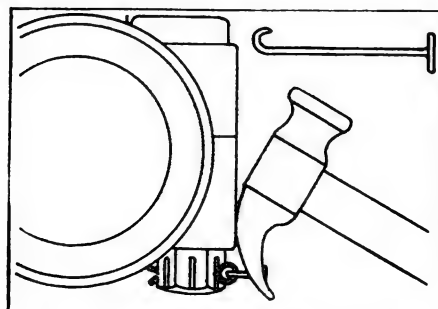


Fig. 316—Using a Bent Nail and Hammer for Removing Cotter Pins.

ADJUSTABLE TAPPETS.

(Figure 314.)

On small engines the valve stem is not adjustable. As soon as the valve begins to wear the clearance between the valve stem and the tappet begins to increase, with a resulting loss of power. To remedy this it is usual to draw out the valve stem. There are devices on the market which in their way make an adjustment possible. The following hint, however, may be found to work out to advantage for the small car owner.

Remove all the tappets from the engine and bore a hole in the end of each, about $\frac{3}{8}$ inch deep and as large in diameter as is consistent with the diameter of the tappet shank. Cut A shows a cross section of the tappet.

Have a machinist to turn up about 50 tool steel buttons such as are shown at B. The outside of the head should be equal to the outside diameter of the tappet shank. The diameter of the shank of the button should be such as to form a smooth fit with the hole drilled in the tappet. The height of the head should be about $\frac{1}{8}$ inch. Put tappets back in engine and fit B into place, as shown at C. Adjust valves by filing so as to get the proper clearance between the buttons on head of tappets and the valve shanks. As soon as this is accomplished remove buttons and harden them.

When the valve adjustment becomes so worn as to require closer adjustment all that will be necessary is to remove the old button, insert a new one which has a higher head, harden and the job is done without pulling out the valves every time.

REMOVING COTTER PINS.

(Figure 316.)

A bent up nail and a hammer solves the difficulty of removing a refractory cotter pin.

If you are not fortunate enough to own a full set of socket wrenches you should break off about a half dozen short lengths of old hack saw blades. The length of the pieces depends upon the depth of your available socket wrench. When using them they should be placed alongside the nut and the socket placed over them.

PORTABLE LIGHTS.

(Figure 317.)

If the flexible wire of a portable light in a garage is constantly getting in the way the insulation is liable to be worn off and consequently short circuits develop. It is an easy matter to remedy this evil and to provide a portable light, which may be kept hanging from the ceiling when not in use under the car.

Locate the attachment plug near the ceiling on one side or in one corner of the garage. Slip one end of the flexible wire through two blocks, the kind that are sold to hold hammocks, and to one of the blocks fasten a light weight sufficiently heavy to balance the portable light. The other block should be hung on a screw eye fastened in the ceiling near the attachment plug. Attach the portable light to one end and the attachment plug to the other end of the flexible wire and the apparatus is completed.

The flexible wire passes from the attachment plug to the weight, through the weight block to the ceiling, through the ceiling block to the portable light. When the light is used it is pulled down and the weight rises; as soon as the light is released the weight pulls it to the ceiling and out of the way.

DIRECTION OF CURRENT.

(Figure 318 A.)

Much harm may be done the storage battery in charging if the current is improperly connected; that is, if the negative supply wire be connected with the positive battery terminal. The apparatus shown in the diagram should be kept handy and used at all times to determine the proper leads from the supply.

Fill a bottle about three-quarters full of electrolyte solution such as is used in storage batteries. For this purpose, however, a solution of salt and water will answer.

Two stiff copper wires should be run through the cork and reach about two inches beneath the liquid. The ends of the wires should be about $\frac{1}{4}$ inch apart. Upon connecting these terminals with the source of supply it will be noted that a great number of bubbles arise from one terminal (the negative), while the other or positive terminal is comparatively free from bubbles.

RADIATOR CURTAIN.

During cold weather it quite frequently happens that the cooling system absorbs too much heat and the proper running of the engine is greatly impaired, in which case it is customary to cover up a part of the radiator to prevent the excess air circulation. A piece of cardboard is a rather unsightly make shift. On most makes of cars the following suggestion will prove practical: Underneath the radiator mount a curtain roller with a dark green or black curtain on it. The curtain may be pulled out over the radiator when necessary and tied to the filler cap securely. When not used the curtain is rolled upon the roller and is entirely out of sight.

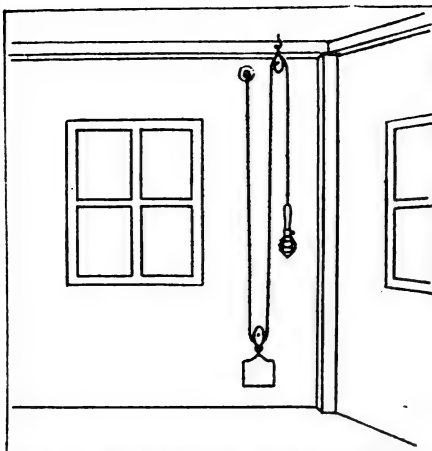


Fig. 317—Arrangement for Keeping Portable Light from the Floor.

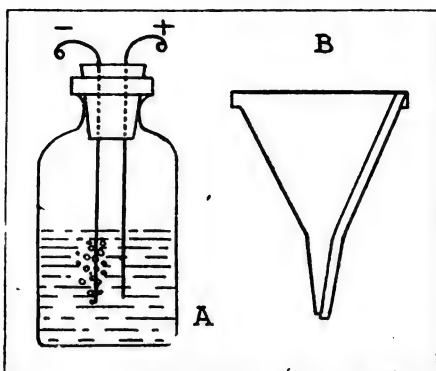


Fig. 318—A, Bottle Detector for Finding Direction of Current; B, Useful Filling Funnel.

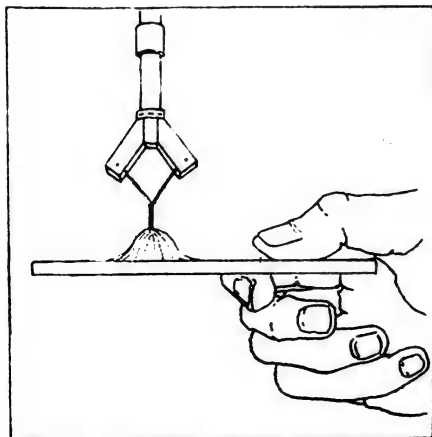


Fig. 319—Illustrating a Handy Soldering Torch.

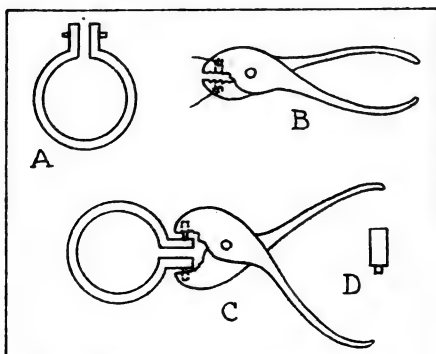


Fig. 320—Device for Compressing Piston Rings.

PISTON RING COMPRESSOR.

(Figure 320.)

The accompanying illustration shows a handy tool for the man overhauling his own engine and its construction calls for materials to be found around any garage. The device consists of a piece of sheet iron about 12 inches long, one inch wide and $\frac{1}{16}$ inch thick; a pair of old pliers and two wire nails. The tool is used for compressing obstinate piston rings so that they may be slipped into the cylinders.

Bend the sheet iron around the piston and then bend back the ends, forming a nearly complete circle, as shown at A. The distance between the turned back ends should be about $\frac{1}{2}$ inch. The ends should be about $\frac{5}{8}$ inch long.

Figure D shows the method of filing the nails to form shoulders. Bore holes in the ends of the sheet iron ring and rivet the nails in place as shown at A. Bore holes in the jaws of a pair of pliers as shown at B. These holes should be large enough to receive the nails easily.

The assembly of the tool is shown at C. Slip over the piston, squeeze the pliers and the most obstinate piston ring will be compressed. With the tool in place the piston can be forced home, the next ring compressed and forced in, and so on until all the rings have passed into the cylinder.

The pliers may be removed from the ring at any time and used for other work. The two small holes in the jaws will not impair their usefulness.

SOLDERING TORCH.

(Figure 319.)

For a number of years the writer has had an inverted acetylene light burner, such as is used on headlights, over his work bench. This is connected to the city gas supply and makes an excellent flame for soldering small work without bothering to heat a soldering iron. It also makes a very handy pipe or cigar lighter for the tool room.

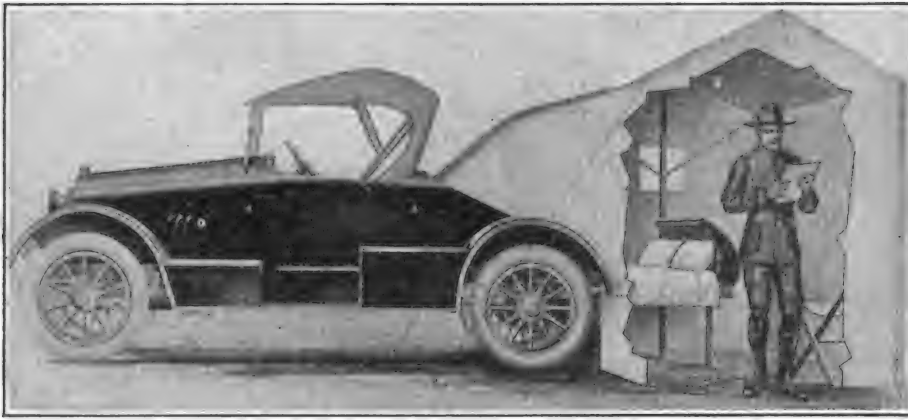
USEFUL FILLING FUNNEL.

(Figure 318 B.)

Unless care is used in filling a gasoline tank by means of a funnel the air pressure will blow the gasoline back. The sketch shows an easy method to overcome this by soldering a small vent tube on the inside of the funnel. If the tube were soldered on the outside it would soon become bent up and its usefulness impaired.

INSULATION.

The rubber insulation of switches, the tops of coils and various other electrical appliances found around a garage and an automobile frequently becomes broken. It is not always desirable to use wood or fiber in replacing the broken parts and a piece of rubber of the proper thickness or size generally is not obtainable. It will be found that, in many cases, pieces cut from old phonograph disc records will answer the purpose. Although this material is slightly brittle, it is a good insulator for ordinary electrical currents.



How Cruiser Car Can Be Used In Warfare.

A Fully Equipped Touring Car

Cruiser Car, A New Make, Provided with Tent, Bed and Other Unusual Equipment

The Cruiser Motor Car Co., Chicago, Ill., manufacturers of the Cruiser car, which, as its name implies, is designed to meet the needs for a car able to make long journeys and afford within itself all the conveniences and comforts one would enjoy on a water craft designed for cruising.

Officers in the European armies when the war first broke out used limousines, town cars and touring cars that had been commandeered from wealthy people, but these machines were without any of the equipment or conveniences that are really essential for the purposes for which the cars were utilized. The officers gradually added to the equipment of their cars and had them altered to meet the needs of the service with the result that at present many commanders have machines that have all the appointments of a comfortable den.

With this experience in mind the Cruiser Motor Car Co. has written to Secretary of War Baker offering to turn over to the government the entire output of the Cruiser factory so that the military service can be equipped with a car suitable for use by officers in conducting their campaigns.

The equipment of a Cruiser car includes a tent, table, two chairs, a bed for two persons, cooking utensils, table service, fireless cooker, stove, camp grate, refrigerator, hot water tank and service pipes, a toilet tent and lavatory with running water, ice water tank and a multitude of other articles the lack of which means the difference between comfort and discomfort. This extra impedimenta, however, has not made necessary any radical body design, the Cruiser being a smartly lined, high-grade roadster, with standard mechanical equipment.

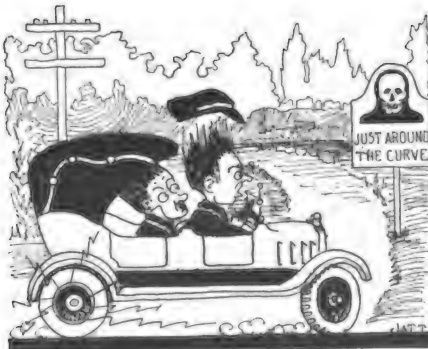
UNIQUE SERVICE GIVEN BY MOTOR PARTS COMPANY.

The Motor Parts Company, 185-187 Columbus avenue, Boston, Mass., which in

a page advertisement appearing in this issue offers to send its new catalogue free to any dealer requesting it, holds a position in the automobile field that is single and can only be maintained by the most thorough organization, a combination of technical and commercial forces which can carry out the orders of the trade as well and perhaps better than the manufacturers whose products are distributed.

EFFECTIVE WARNING SIGN.

A ROAD engineer in North Carolina having almost despaired of devising a sign that would impress the joy riders that there was really danger ahead on the highway approaching a sharp turn, made up a sign with a "death's-head" painted on it and hung it at one of the points approaching an acute turn in the road. The sign is designed to inspire the necessary fear that would cause a reckless driver to throw out the clutch and jam on the brakes. Such a warning, which suggests that the driver who is not cautious might continue his journey into the next world in high, should have its effect, unless he had suicidal intent in the first place.



The Motor Parts Company started out to "do business different." Its success, therefore, depended entirely on how well and of what value the service they rendered was to the trade. The absolute success of the company proves its idea correct and proves that the men who put the idea into forcible action were capable of carrying it to a successful conclusion.

The fundamental idea of the Motor Parts Company was to combine within its own organization knowledge of the manufacturer and distributor and to attach this organization, so to speak, to every dealer who handles products distributed by the Motor Parts Company, in such a manner that the trade can claim the Motor Parts organization a part of their own, thereby giving the most expert and intelligent service to their customers. In other words, every dealer who handles products distributed by the Motor Parts Company sells factory service with the product, which service is always at hand.

The Motor Parts Company now has four branches, located at Boston, Springfield, Buffalo and Philadelphia, and is about to expand further. At each place the company maintains shops equipped with the latest testing instruments for promptly determining trouble in any starting, lighting or ignition equipment, maintains service men who are always ready to assist the dealer and the automobile owner, and, of course, carries complete stocks of all products distributed.

The principal field covered by the Motor Parts Company is that of ignition, starting and lighting equipment with all accessories, such as cable, batteries, etc., for the automobile, aeroplane and motor boat. Installations are made by the company and by the trade through the company on any type of engine.

The new catalogue which the Motor Parts Company is now offering to the trade is perhaps the most complete book of its kind and it has been called by interested people a "trade reference book" on Bosch instruments. It contains more than 100 pages of Bosch ignition, starting and lighting equipment and spare parts price lists of present and former types.

DITCHING WITH DYNAMITE IN ROAD CONSTRUCTION.

In the recent construction of a section of highway in Pennsylvania the contractor was embarrassed through the lack of labor and had to make several lengthy ditches for drainage purposes in locations where the regular ditching machines would not work to advantage. At first he was at a loss as to what course to pursue when the idea of using dynamite occurred to him.

A row of holes were drilled for a distance of 250 feet where the ditch was to be constructed. They were all blasted at once by electricity with the result that a perfect ditch of the required depth and width was created in but a fraction of the time that would have been necessary had it been dug by laborers or made by a ditching machine.

How Splitdorf Tests Equipment

Exceptionally Complete Testing Apparatus Now Installed in Boston Service Station

Being always on the outlook for means of improving its equipment so that its patrons may obtain the largest possible measure of service, the Splitdorf Electrical Co., Newark, N. J., has recently installed in all its 21 branches throughout the country a very complete apparatus for testing all Splitdorf products quickly and with the greatest accuracy. The apparatus is identical with that used in the company's home plant, though, of course, built on a smaller scale.

The illustration on this page shows the apparatus as installed in the service station of the Splitdorf Electrical Co. of Boston, at 1112 Boylston street, which is under the management of Robert M. Ellis. This is one of the most important stations in the whole Splitdorf service organization, and serves all of New England, except Western Connecticut. Manager Ellis advises that during 1916 his station's work men inspected, adjusted and repaired the electrical equipment of more than 5000 cars that were brought into the company's garage, while the men in the repair department handled an average of 3500 unmounted magnetos and 5000 coils.

The new testing apparatus now installed will allow the station to handle a much larger volume of business. The apparatus is very complete, inasmuch as it is constructed to allow the making of tests on all Splitdorf products, such as high and low tension magnetos, starting motors, lighting generators, transformers, spark plugs and detail parts of those units.

Underneath the test table is a variable speed motor, which can be regulated by rheostats to drive magneto and generator countershafts by silent chain at rates of speed ranging from 30 to 4000 revolutions per minute. This makes it possible to test instruments even at lower or higher speeds than when in actual use.

The magneto countershaft is designed to be coupled to drive all types and sizes of Splitdorf magnetos for testing purposes. Close observation of the characteristics of the spark at the electrodes is had by watching the spark plug panel containing 12 plugs and mounted directly behind the instrument on test.

Tests of mag-dynamos, for motorcycle use, are also taken care of on the same stand, the instruments showing the charging rate and voltage of the battery and dynamos being mounted on the board directly behind the plug panel.

A low tension magneto, driven by the dynamo countershaft, is used to test all transformers, the spark being distributed to a separate spark plug panel. The specifications on all magnetos and coils tested call for a spark distributed to

four, six, eight or 12 plugs, whatever the model might be, across a $\frac{3}{16}$ " gap, which is equivalent to about 85 pounds compression across a $\frac{1}{32}$ " gap. The speeds are from 100 to 4000 revolutions per minute.

The generator countershaft is arranged to drive one or two-unit type generators at variable speeds, which makes it possible to get volt and ampere readings of the output. Switches controlling six-volt and 12-volt currents are mounted on the table with leads to connect direct to the generator terminal posts. Starting motors are tested by brake method for horsepower, etc.

The test table also carries other apparatus for regulator adjustments, cut-out settings, low and high-tension armatures, generator armatures and condensers. Tachometer readings are taken on all machines tested to register the revolutions per minute.

The magnet charging outfit is equipped with a hot wire voltmeter and special compass for determining the magnet strength after being charged, and also the polarity.

PACIFIC AUTO SHOW MAY BECOME NATIONAL.

Following the opening of the Pacific Auto Show at San Francisco, in the Civic Auditorium, which was preceded by an address by President Reeves of the National Automobile Chamber of Commerce, talk was revived of making the exhibition a national event, the same as those at Chicago and New York, which

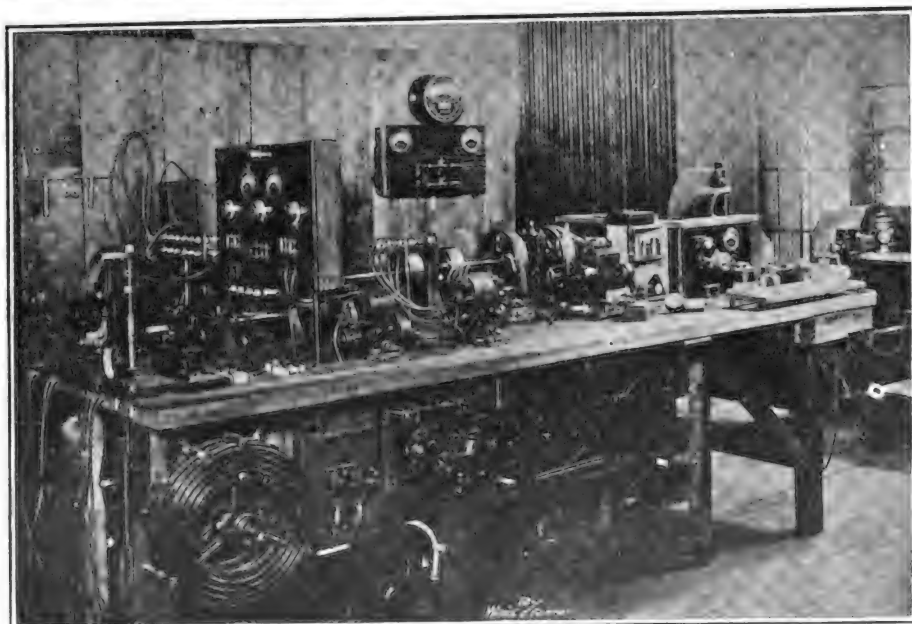


Robert M. Ellis, Manager and Treasurer of the Splitdorf Electrical Co. of Boston.

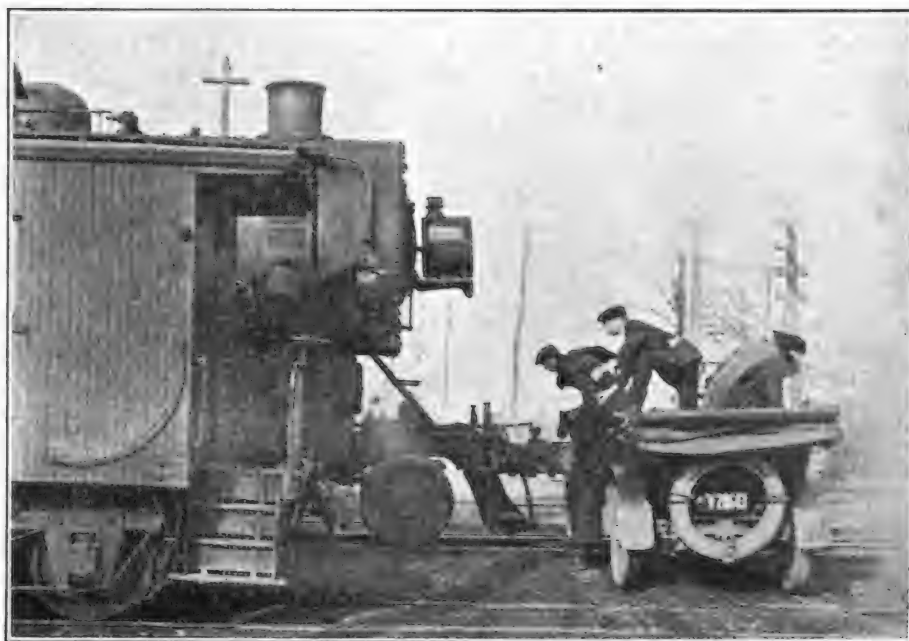
are financed by the manufacturers instead of the dealers and distributors.

The manufacturers now conduct one show in New York for the East and one at Chicago for the Central West, and the backers of the movement to have the Pacific show made a national event, say that the manufacturers should also get back of the San Francisco show and make it their Western exhibition.

Prof. E. M. Lockwood of the Scheffield Scientific School at Yale University, states that running tires underinflated costs more than the breaking down of the tire itself and that as a result of underinflation fuel consumption can be increased as much as 25 per cent. He also states that over 60 per cent. of the power lost between engine and wheels is due to flexure of tires.



Testing Apparatus Used by the Splitdorf Electrical Co. of Boston to Test All Kinds of Splitdorf Products.



"Think Safety" to Avoid Such an Accident as This. Picture Posed by C. C. C. & St. L. Railway.

of an annex to provide extra space, there was not enough and that next year bigger quarters will have to be secured, as it is planned to hold a tractor exhibition in connection with the show.

Following is a list of the car exhibits:

Detroit Electric, Apperson, Grant, Auburn, Cadillac, Scripps-Booth, Chalmers, Velle, Monroe, Drummond, Rauch & Lang Electric, Milburn Electric, Ford, Franklin, Peerless, Haynes, Smith Form A, Garford, G. M. C., Crow-Elkhart, Stephens, Nelson, H A L, Lozier, Chevrolet, Premier, International, Reo, Oakland, Kissel, Service, Stearns-Knight, Regal, Mercer, Hupmobile, Maxwell, Elgin, Republic, Kelly-Springfield, Hudford, Dodge Bros., Paige, Buick, Glide, Paterson, White, Pullman, Hollier, Saxon, King, Chandler, Packard, Marmon, Federal, Vim, Marion-Handley, Case, Oldsmobile, Hudson, Allen, Jeffery, Empire, Pierce-Arrow, Mitchell, Studebaker, Dort, Pathfinder, Cole, Inter-State, Willys-Knight, Overland, Davis, Sun, Chalmers, Jackson.

"THINK SAFETY" TO AVOID BAD ROAD ACCIDENTS.

If the average car driver could only practise the custom of thinking of safety as he drove along the highways it is the belief of the officials of the Cleveland, Cincinnati, Chicago & St. Louis Railway Company that many of the fatal accidents that occur at double railroad crossings would never happen.

Most of the accidents result from the fact that when automobilists arrive at double track crossings, they will wait until one train has passed and then hurry across directly behind the caboose, never pausing to think of trains approaching on the other track. If these drivers were accustomed to thinking "safety" they would always wait long enough to determine if another train was approaching on the second track from another direction, before proceeding.

In the accompanying picture the subjects and objects were arranged to show how easily an unthinking driver can jeopardize his own life, together with the lives of the other occupants of his car.

PRICE OF PEERLESS UP: \$90 TO \$100.

The Peerless Motor Car Co., Cleveland, O., has advanced the prices of all its models, the new schedule becoming effective Feb. 28. The new prices are as follows: Touring car and roadster: \$1980; sedan, \$2840; limousine, \$3350.

GRANT SIX PRICE ADVANCED TO \$875.

The Grant Motor Car Corp., Cleveland, O., has announced that the price of the Grant Six was raised from \$825 to \$875 on March 1.

DOBLE STEAMER TO SELL AT \$2500.

The Doble steam car, manufactured by the General Engineering Co., Detroit, Mich., will sell for \$2500, both the touring (Continued on Page 55.)

Three Hundred Cars at Brooklyn

Pleasure Car Show Was the Most Successful Ever Held in the City

There were close to 300 cars exhibited at the automobile show in Brooklyn, N. Y., held during the week of Feb. 26-March 3, under the auspices of the Brooklyn Motor Vehicle Dealers' Association, in the Twenty-third Regiment Armory.

The show was managed by a committee of the association, composed of Herbert L. Carpenter, chairman; C. M. Bishop, I. C. Kirkham, A. E. Randall, A. D. Corwin and C. T. Maxson, which will also conduct the commercial car show that is to be held during the week of March 3-10.

The following makes of pleasure cars were exhibited at the show:

Abbott-Detroit, Apperson, Allen, Buick, Briscoe, Chalmers, Chandler, Chevrolet, Cadillac, Case, Cole, Dodge, Dort, Daniels, Franklin, Grant, Haynes, Hupmobile, Hudson, Jeffery, Kissel Kar, King, Lexington, Liberty, Locomobile, Maxwell, Marion-Handley, Marmon, Mitchell, Murray, National, Owen-Magnetic, Oakland, Overland, Oldsmobile, Paige, Packard, Peerless, Pierce-Arrow, Premier, Rauch & Lang, Reo, Saxon, Standard, Scripps-Booth, Stearns, Stutz, Studebaker, Velle, Vim, Westcott, Winton and White.

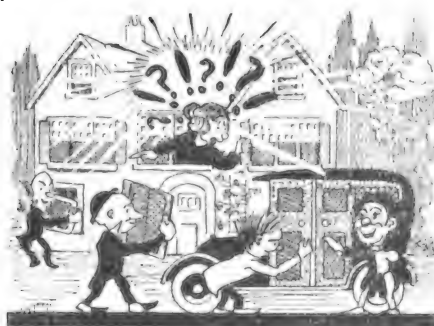
TWELFTH ANNUAL AUTO SHOW AT OMAHA, NEB.

The 12th annual automobile show of the Omaha Automobile Trade Association, held in that city during the week of Feb. 26-March 3 inclusive, included exhibits of 180 pleasure cars and 60 trucks, which were displayed by 61 different exhibitors.

Clarke G. Powell, manager of the show and secretary and treasurer of the association, states that despite the erection

SCREENS FOR MOTOR CARS.

SINCE Earl W. McGookin, the sales manager of the Springfield Body Company of Detroit and Springfield, Mass., discovered that Pullman screens were admirably suited to use on automobiles, as they both shed water and protect the occupants from being stared at, yet not preventing them from seeing out of the car, it is feared that during the coming season the home owners who have such screens on their residences will have to take precautionary measures to prevent them from being appropriated by nocturnal motorists who are equally unscrupulous in obtaining other accessories for their joy riding vehicles.



The Plug that made this Record Possible

The Plug with the Green Jacket



NON STOP CAR TEL. D.B. 5916



THE RECORD

SPLITDORF ELECTRICAL CO., of Boston

Car Started November 22, 1916.
Stopped January 25, 1917.
Total days run 64, Miles driven, 23,500.

1112 Boylston Street, Boston, Mass.



The Apperson Car Is 34 Years Old This Year. Illustration Shows the 1917 Eight Model.

The Story of the Apperson Car

Elmer Apperson Is Said To Have Built the First Successful American Gasoline Car.

There was a little machine shop on the site of plant No. 1 of the present Apperson Brothers Automobile Co., Kokomo, Ind., where in 1893 Elmer Apperson of that city built what is claimed to have been the first successful American gasoline automobile. Owing to the growth of the company's business plant No. 1 was outgrown and a new one was erected in another part of the city, which is known as plant No. 2 and which was recently occupied by the Apperson company.

The Apperson brothers, Elmer and Edgar, have been closely identified with the development of the gasoline automobile since it was first brought out by them in this country in 1893. Two years later they were awarded a cash prize for having designed and built the best balanced gasoline motor for use as a power plant in "horseless vehicles." This award was made in connection with the first automobile race ever held in America. It was run under the auspices of the Chicago Times-Herald.

In 1903 the Apperson Brothers Automobile Co. was formed with a capital of \$23,000 to engage in the manufacture of automobiles. From that time up to the present the company has experienced a conservative but steady growth and this year they will manufacture 4500 Apperson cars. The increased production has been made possible by the new factory, which together with the old plant provides 1,000,000 square feet available for manufacturing operations.

Elmer Apperson, president of the company, in speaking of the new plant, says:

The decision to build the new plant was no suddenly determined move. The program of expansion of which it was a part, was only decided upon after mature deliberation. As you know Apperson cars

from the time our company was first incorporated up to five or six years ago always sold for \$5000 or more. We built them only for the more exclusive trade in the larger cities. Ours was a business similar to that of many European manufacturers—we manufactured custom built automobiles. It was the aim of my brother Edgar and I from the start to put on the market nothing but the very highest grade car.

Later on in our manufacturing life when the improved machinery and the change in conditions as they affected the material market made quantity manufacturing possible, we decided to increase our output, but still remain true to our manufacturing ideal, viz., that nothing but the best in workmanship and materials should enter into Apperson cars. Very soon this policy taxed the capacity of our plant, which has grown to cover all of the available ground in its vicinity, so we decided upon the plans for a new and larger group of buildings to be laid out ideally, based on the experience we have gained in our 20 odd years of manufacturing. Something had to be done to meet the increasing demand. So the new factory was projected and also the policy of keeping strictly to the manufacture of but two chassis was adopted.

Concentration upon these two models was necessary to enable an increased production. It is the only feasible plan for quantity production, of course. For the past year we have been spending practically all of our time in working upon the two models comprising our line—the Light Eight and the Light Six.

We have had our fingers on the pulse of the automobile market and our expectations have been fulfilled in every respect. The fact that during the past year we have done more business than in any previous year in our 24 years experience is proof of that fact. The business in the month of September this year exceeded even our biggest spring month.

In view of all these facts the plans for our new factory giving us an additional floor space of nearly 500,000 square feet were not at all unusual. The new plant practically doubles the acreage of our buildings, as the new group extends over about twice as many acres as the old.

The last of the new buildings is completed and we have succeeded in transfer-

ring all of the machinery from the old plant to the new. This was done without a great deal of interference to production, as we would work a group of machines up to closing time on a certain day and then dismantle them, moving them to the other plant during the night so they could be set up and in readiness for operation the next morning. In this way we saved considerable time and also expense through suffering no great loss in production. Of course the moving was expensive, but we feel that it will be made up to the company through the increased production made possible because of the improvements and conveniences incorporated in the makeup of the new buildings. In this new group we have invested in the neighborhood of \$300,000, which represents additional machinery and the buildings themselves.

All of the new buildings are of the most modern type of construction. They are single story and equipped throughout with concrete floors and alley ways. The entire group, without doubt, makes one of the best lighted automobile plants in this country, as at all times during the day they receive practically uniform light.

The roof of each of the different buildings is designed upon the prismatic principle, with all of the windows toward the north diffusing the steady light downward. We find that this has a very appreciable effect upon the quality and quantity of work which can be turned out.

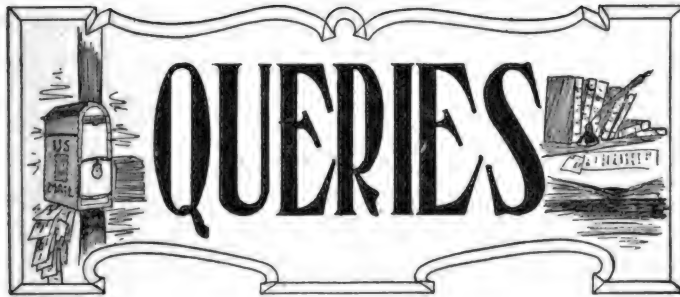
In laying out the plant we have had in mind primarily the progress of the stock through the shop. Under the present arrangement the rough stock comes in at one end of the main factory building and goes out at the other a completed tested chassis. Then it is sent over into the building set apart for painting and final assembly and when it emerges from there it is a completed car which can leave our own railroad loading platform for any part of the world. There is absolutely no lost motion throughout the plant in any one of our several departments. An innovation is found in the chassis test barn where stalls have been provided for each separate car. This will greatly facilitate the work. Also in the paint shop have been constructed baking ovens for the bodies, which insures a lasting finish. By baking on the different coats in the paint process it is possible for us to put a finish on our bodies which will hold its lustre. The enameling and the blacksmith departments also are outfitted new in every way, so that the work from these departments will be of the highest class.

The major part of our manufacturing will now be handled in the new group of buildings and, of course, the old plant will also be utilized, as we find that the demand for Apperson cars has grown to the point where it will tax the capacity of both sets of buildings to take care of it. Running as we are now the new equipment will give us an output of 4500 cars yearly.

About a year ago an export department was established to take care of the company's rapidly increasing foreign business, most of which developed itself, the company making no effort to get business from abroad until recently. Apperson cars are now being shipped to all parts of the world and this end of the business is managed direct from the factory.

The officers of the Apperson company are: Elmer Apperson, president; T. E. Jarrad, vice president, and Edgar Apperson, secretary and treasurer.

The motor license fees for January in the State of New Jersey were \$912,522.57, as compared with \$519,000, the total receipts for January, 1916. An estimate based on the receipts in that state to date places the total for the year at \$1,800,000, as compared with \$1,402,000 for 1916.



NOTICE TO READERS.

THIS department contains the Mechanical Editor's answers to readers' inquiries. It is open to every subscriber. If any part of your car is not operating satisfactorily, or if you desire information regarding operating, maintaining or repairing motor cars, do not hesitate to lay your troubles before him. He will answer promptly and fully, either by mail or in these columns, as you direct. This service is free to every subscriber, and is often the means of saving considerable money that otherwise would be spent with a garage man. Letters should always be signed with the writer's full name and address, and the car or part in question should be properly identified, by mentioning the maker's name, model, year of production or other distinguishing feature. Address all inquiries to the Mechanical Editor.

POURING BEARING FOR CRANKSHAFTS.

(F. J. H., Vesper, N. Y.)

I have a 1910 Maxwell car. Please tell me the best way to run new bearings for the crankshaft and connecting rods?

Unless you have the tools and have considerable mechanical experience you had best have the work done by an expert repairer. Pouring bearings and aligning the pistons are not jobs the amateur mechanic should undertake. The following advice may be useful to you if you desire to attempt the work:

Accurately measure the diameter of the crankshaft at the journals and crankpins and the length between the outer edges of the front and rear journals. Have two mandrels turned from iron or steel pipe if possible; if pipe is not obtainable solid stock can be made to serve. One should be nine inches length and the other at least six inches longer than the crankshaft between the points measured, and both should be $1/32$ inch smaller diameter than the smallest diameter of the crankpins or journal. Three sets of two collars each (one for each main bearing) should be turned. These should be from $3/8$ to $1/2$ inch wide, and each collar should be recessed from the bore so as to exactly fit the main bearing caps. The purpose of the collars is to hold the mandrel in precise relation in the engine block while the metal is being poured. Each collar should be drilled from the outer face to the bore, and the hole tapped for a set screw, so that it may be held in place. The depth of the recess in each collar will depend upon the shape of the main bearing cap. Each collar should have a single groove across it from bore to circumference to vent the cast and insure against porous metal. The groove may be $1/8$ inch depth.

A set of two collars should also be made in the same manner for the small mandrel. This set is for use in pouring the connecting rod bearings. The mandrels are used with the connecting rods.

The babbitt should be thoroughly heated and when properly melted will flow easily. The proper point may be determined by dropping a piece of paper into the ladle; if it "flashes" the metal is of the proper temperature; if it burns or chars the metal should be heated to a higher temperature.

The mandrel must be thoroughly heated while the babbitt is being poured. This may be accomplished by the use of a blow torch, or by inserting a bar of red hot iron into the hollow mandrel. If the mandrel is not preheated the babbitt will not flow properly into the mold.

The mandrel may be hung in V blocks to pour the connecting rod bearings, and the metal poured through the hole in the bottom of the connecting rod, as shown in sketch.

It is always advisable to use shims in the connecting rods and all bearings where possible before beginning to pour same. Shims should be made of some heat resisting material such as thin sheet steel, oiled paper or fiber, and should be made of such a thickness or packed in such a number as to permit scraping the bearing in after it is poured.

After the bearing is poured it will be necessary to cut through the babbitt from the side to separate the cap from the base of the bearing.

The bearing as it comes from the mold is usually rough and irregular and the babbitt will not fit the shaft perfectly. There will be large or small projections upon the surface, which will have to be scraped off so as to give a large bearing surface. If the bearing is used in this state the hammering of the explosion will soon hammer down the high places and leave the bearing loose upon the shaft.

In the case of the connecting rods the bearings may not allow the connecting rod to stand at right angles to the crankshaft and is said to be out of alignment.

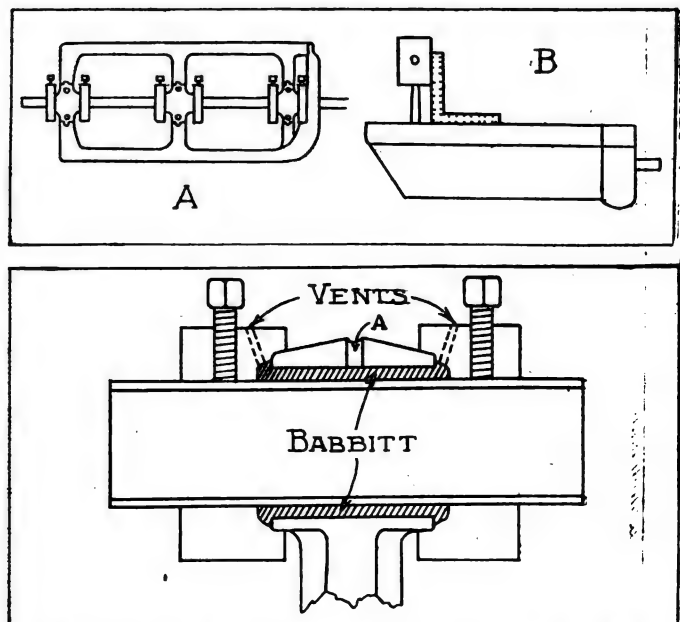
From the beginning of the work it must be understood that eventually every piston must be in alignment; that is, the sides of every piston must be in line or parallel with each other, and the line drawn down the sides to the crankshaft must be perpendicular with the centre line of the crankshaft. It must also be understood that the centre line of the crankshaft must be parallel with the top surface of the crank case. The test for alignment of pistons should be applied before beginning on the scraping operation and the correct relationship of pistons to crankshaft held during the scraping operation.

The test for alignment of the crankshaft: A straight edge should be placed on the surface of the crank case and the distance between this edge and the top of the crankshaft measured. This distance should be the same on both ends. When setting up the jig for babbitting this should be borne in mind, and the mandrel adjusted accordingly.

In testing the pistons for alignment one piston at a time is placed on the crankshaft. A square placed on the surface of the crankcase from end to end; that is, on a line with the centre of the crankshaft, should correspond with the side of the piston.

Squeeze a small drop of Prussian blue (a blue paste which may be purchased at the hardware store) on to the shaft and then with the end of the finger spread it around the bearing surface. Clamp the connecting rod into place and swing it around the shaft once or twice; then remove and it will be noted that there are spots where the shaft has deposited the

(Continued on Page 56.)



A, Main Bearing Mandrel with Collars, in Place. B, Method of Testing Pistons for Parallelism. Connecting Rod Mandrel with Collars, in Place.

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car and roadster. With production plans rapidly progressing and a promise of deliveries in the early fall it was deemed advisable to make an announcement of the price owing to the great interest created in the car when it was exhibited at shows in New York, Chicago and Detroit.

NEW PREST-O-LITE STATION IN BOSTON.

The Prest-O-Lite Co. has moved its Boston branch and service station from 16 Columbus avenue into larger quarters at 709 Beacon street, where complete facilities are afforded for the repair and charging of automobile starting, lighting and ignition batteries, in addition to carrying a large stock of acetylene appliances and Prest-O-Lite cylinders of various sizes for lighting, oxy-acetylene welding and cutting and all commercial purposes.

NEWLIN PIERCE-ARROW AGENT IN SOUTHWEST.

William B. Newlin, passenger car sales manager of the Pierce-Arrow Motor Car Co., Buffalo, N. Y., has resigned and will be associated with an agency in the Southwest to sell Pierce-Arrow cars and trucks in Texas and Oklahoma. He is entering the concern of Gray & Reardon as vice president and sales manager, a corporation having been formed to handle all of Texas and the greater part of Oklahoma with the title of the Gray, Reardon, Newlin Co., which will have headquarters at Dallas and will maintain branches at all important points in the two states.

Before taking his present position Mr. Newlin represented the Pierce-Arrow company in Europe as service engineer, returning about a year before the war to assume the management of the sales promotion department of the factory.

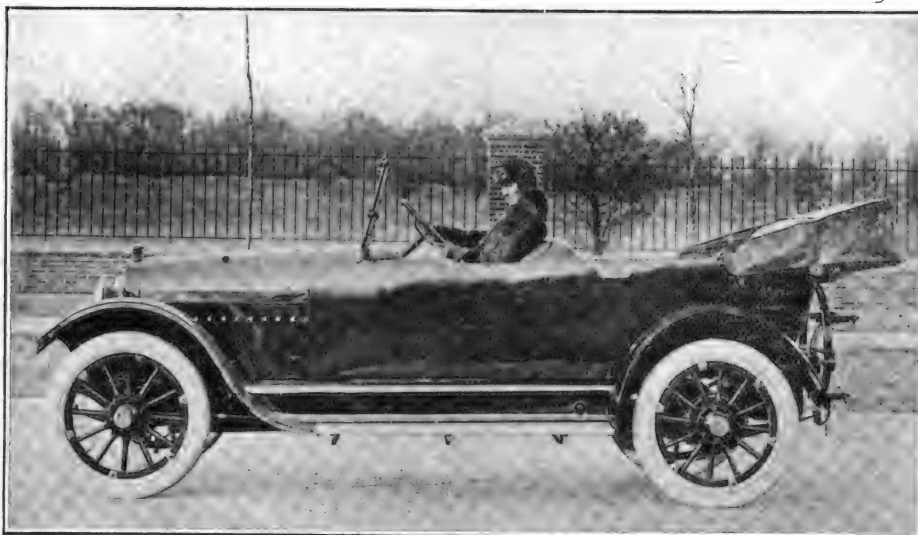
WOMAN DEALER DRIVES 1200 MILES FROM FACTORY.

Mrs. Zona Berg, agent for Dodge Bros. cars in two counties in Kansas, and two counties in Nebraska, when she found that the freight car shortage was preventing the delivery of cars from the factory, went to Detroit, together with her mother, Mrs. J. H. Kesterson, her 12-year-old son and two mechanics, and brought back four cars over the roads, a distance of 1200 miles.

Inclement weather and very unfavorable road conditions were encountered for most of the distance, but this did not discourage the intrepid Mrs. Berg and her party.

DETROIT S. A. E. SECTION HAS 780 MEMBERS.

At a recent meeting of the Detroit S. A. E. Section, Chairman W. C. Keyes reported an increase in the membership of over 100 and that the present membership totaled 780. A membership campaign is being conducted and it is expected that there will be 1000 members in another month.



The New Empire Light Six Model for 1917, Shown at Boston Show for First Time.

New Empire Model Announced

Light Weight Car Is Shown at the Boston Show, Making Its First Public Appearance

ONE of the models to make its first appearance before the public at the Boston show is the new Empire Light Six for 1917. While in no sense is the new model freakish, its lines are sufficiently different from the conventional to make it very attractive. Its 120-inch wheelbase takes the machine out of the small car class, though its weight is lighter than ordinary. The price is \$1625.

Features of refinement noticeable in the new model concern a high, deep cowl, topped by a tilted windshield, the combination of the double cowl design with the divided parlor car front seats, and a marked roominess of leg and seating space. The lines of the body are

curved and accentuate the size of the car.

Two standard color and upholstery combinations are offered; cobalt blue body with black long grain leather and autumn brown body with brown Spanish leather to match. While the standard car is of five-passenger capacity, provision is made for two disappearing auxiliary seats, they folding into the backs of the front chairs when not being used.

The chassis does not differ in essentials from other Empire models, except in the change to Hotchkiss drive with full floating rear axle. The engine is a 38 horsepower, six-cylinder Empire-Continental construction and the clutch a dry plate disc type, the engine, clutch and transmission gearset forming a unit power plant. The gearset is the conventional three-speed forward and reverse selective type, the main shaft being carried on New Departure ball bearings.

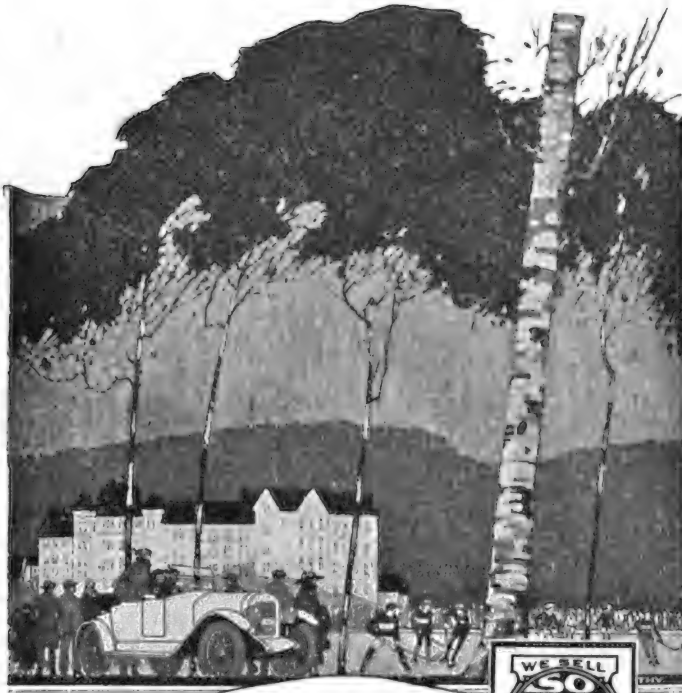
It is back of the transmission that the mechanical changes are seen. The propeller shaft is provided with a universal joint at each end. The rear axle is a full floating type in which the spiral cut drive gear and pinion are extra heavy.

The frame is a deep channel section of heavy gauge pressed steel reinforced by four sturdy cross members and the Empire rigid bridge construction at rear. Front springs are semi-elliptics and the rear three-quarter elliptics. Wheels are of the 12-spoke artillery type, front and rear. Tires are 34 by four, with non-skid on rear.

The standard equipment is unusually complete, it including a five-bow, one-man top, covered with double texture fabric, one piece demountable rims, one extra being supplied, speedometer, motor driven horn, foot rail, pump, snubber straps and a very complete tool kit.



W. B. Newlin, Formerly Passenger Car Sales Manager of Pierce-Arrow Co., Who Goes to Texas as Pierce-Arrow Distributor.



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Pouring Bearing for Crankshafts.

(Continued from Page 53.)

blue paste on to the babbitt. The high spots will show the friction points clean and surrounded by the blue. These high places should be removed by carefully scraping with a scraper or knife. Do not remove too much. The connecting rod is again put into place and the same process repeated again and again until all parts of the babbitt bear upon the shaft. Remember that patience is required in this work; once the babbitt is scraped off it cannot be replaced, therefore scrape only a small amount away at a time.

The opening between the cap and rod should then be filled with shims, and the rod put into place. The cap should be screwed down upon the shims and bear upon the shaft just enough to allow the connecting rod to swing upon it slowly of its own weight.

The main bearings should be poured and scraped in the same manner. The mandrel in this case, as has been explained, runs through all of the bearings. It may be necessary to bore holes in the caps of these bearings through which to pour the babbitt. It will be found more convenient to place the engine upside down on a bench to pour the main bearings.

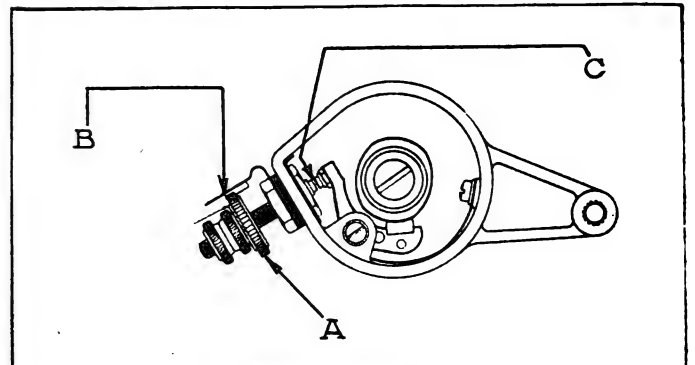
After the bearings are scraped in the oil holes should be drilled through the babbitt, and it is the custom to cut oil grooves in the babbitt to help distribute the oil. These should be in the shape of an X, the centre of the X being the oil hole.

In working on babbitt bearings, emery cloth or files should never be used as particles of emery or iron are apt to be left in the babbitt and will score the crankshaft.

QUERIES ABOUT MAGNETO AND CARBURETOR.

(H. M., Long Island City, N. Y.)

How do I adjust a Schebler model L carburetor? What is



Remy Magneto Breaker Box.

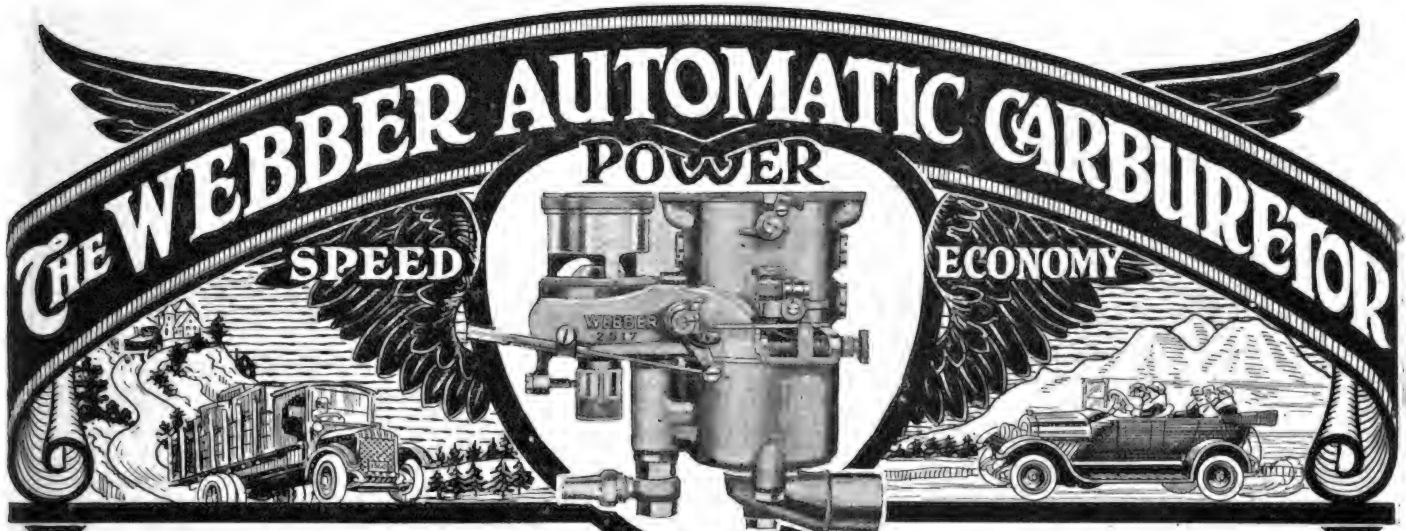
the correct timing and adjustment of a Remy magneto?

We gave directions for adjusting a Schebler carburetor in the Dec. 25, 1916, issue of The Automobile Journal. We publish herewith a cut of the breaker box of the Remy magneto, which shows the points at "C" open by cam. At its maximum separation the gap between the points at "C" should be between .025 and .030 inch. To get this adjustment turn the magneto shaft until cam opens the gap to its maximum. Pull the spring "B" back so as to allow turning of adjustment "A," and adjust the gap by turning "A" to .025 or .030 inch as above.

You did not state the type of magneto which you have, but we are giving herewith the proper method for timing the two models RL and RD for four-cycle, four-cylinder engines.

Type RL has a timing button between the two top terminals on the distributor.

Turn the engine over by crank until No. 1 piston reaches top dead centre on compression stroke (spark set at retard). Press in on the timing button at the top of the distributor and turn the magneto shaft until the plunger of the timing button is felt to drop into the recess on distributor gear. With the magneto shaft in this position couple same to motor. No attention to the circuit breaker is necessary in this case, as it is automatically brought into the correct position, and the distributor segment is in contact with No. 1 terminal, which is plainly marked on the distributor.



It has qualities that insure a satisfaction not obtainable with any other instrument. The gases are entirely controlled by the piston speed of the engine. There is perfect control at all speeds, regardless of throttle manipulation. It will afford you

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Model C made in 1 in., 1¼ in., 1½ in., 1¾ in., and 2 in., and 3¼ in. vertical outlets, and Model E in 1 in. and 1¼ in. horizontal outlet.

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NEW YORK, N. Y., 1765 Broadway

F. B. DONOVAN, N. E. Distributor, 1096 Boylston Street.

Type RD is set as follows: Turn the engine over by crank until No. 1 piston reaches top dead centre on compression stroke (spark set at retard). Turn the magneto shaft until the points in the breaker box are about to break and with the magneto shaft in this position couple same to motor.

With the magneto still in this position inspect the distributor box and find which terminal the distributor segment is opposite. This distributor terminal is connected with No. 1 cylinder; the remaining terminals are connected in their proper firing order, which, of course, depends upon the engine used.

A FORD CAR ON A HILL. (R. L. F., Monticello, N. Y.)

I have a 1916 Model T Ford touring car. Can you tell me why it sometimes jerks or jumps in going up a hill? What is the best setting for the spark and gas? What makes a spark plug become covered with oil? What causes a grind in the transmission when running on high speed?

The trouble you experience in trying to climb a hill with your car is probably due to incorrect spark setting. When starting the engine the spark should be retarded as far as possible, after which it should be advanced as far as possible without causing a knock in the engine. When a steep grade is encountered it will be noticed that as the car gradually slows down a dull knock is heard, which is a signal for retarding the spark. The spark should be retarded until the engine ceases to knock. As soon as the top of the grade is reached the spark should be advanced.

It may be, however, that the gasoline feed pipe between the tank and the carburetor is clogged; a piece of waste or packing often works loose in the joints and partially fills the pipe and when a grade is reached the gasoline does not run freely and so the engine skips. On a very steep grade the level of the gasoline in the tank may be below the carburetor, in which case the engine will skip and might stop entirely.

An engine having a surplus amount of carbon deposit in

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the cylinders will not run smoothly on a grade. Your third question would indicate that such a condition might exist in your engine. Try placing about two tablespoonfuls of kerosene oil in each cylinder, through the spark plug holes, when you have returned from a trip and the cylinders are hot. Let the kerosene remain in the cylinders for a few hours; you will find that a quantity of the carbon will be blown through the exhaust when the engine is started.

The setting for the throttle or "gas" is entirely dependent on the speed you wish to attain. The needle valve on the carburetor should be open only enough to allow the engine to run idle. Turn the needle valve around clockwise; i. e., toward the right, until you feel it brings up against its seat, and then turn it back about half or three-quarters of a turn and start the engine and throttle it down as much as possible. The engine should run with the throttle valve in the last notch of the quadrant on the steering wheel. Adjust the needle valve so that it admits just enough gasoline to allow the engine to run, without skipping, with the throttle in this position. The adjustment of the needle valve varies in different carburetors—in some cases one-half turn is sufficient, in others, 1¼ turns are necessary.

A spark plug may be covered with oil or carbon either from excessive oil supply, or leakage in pistons and piston rings, permitting the passage of oil from the crank case to the cylinder head. You may find that a heavier grade of oil will solve this difficulty. This problem is solved in our answer to G. B., Holtsville, N. Y., which appears in the Feb. 25 issue of The Automobile Journal under the heading, "Leak Proof Piston Rings."

The grind in your transmission case is probably due to a poorly adjusted brake band on one or more of the transmission brake or speed cones. These bands, if adjusted too tightly, drag on the drum and the friction causes a grinding noise. When examining them see that the springs which hold the bands apart are so adjusted as to keep the ends under tension. It would be advisable for you to drain off the oil from the engine and crank case and see if it feels gritty; if

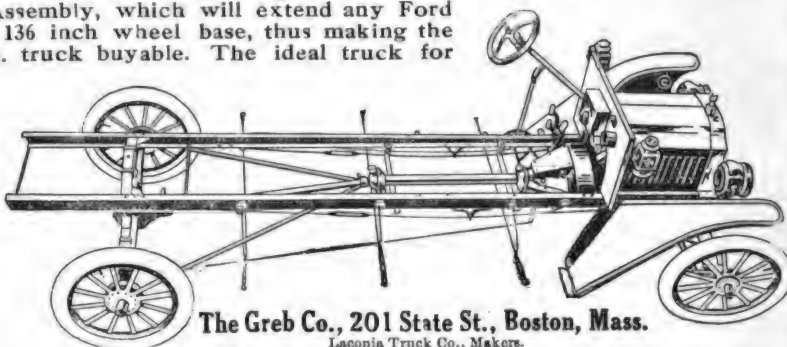
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PISTON RINGS**

JOINT OPENS

YET

REMAINS CLOSED

**a ONE PIECE ring that STOPS OIL TROUBLE
and HOLDS COMPRESION**

Boston Automobile Show—Space 444—Dept. E.

**CRAIG-WYMAN COMPANY INC.
93 Massachusetts Avenue, Boston**

It does, replace it with new oil. Be sure to strain the oil through either cheese cloth or fine wire mesh before placing it in engine. When used for a long time oil loses its lubricating qualities and should be replaced.

LEAK PROOF PISTON RINGS.

(G. B., Holtsville, N. Y.)

I have just bought eight new leak proof piston rings for my engine, which has been leaking oil through the pistons. Would you advise me to bevel the pistons where the lower ring is? What is the reason for the motor knocking?

Is there any firm making a governor for attaching to an engine so that it can be used for stationary power?

You may find by installing the new leak proof piston rings that your oil trouble is eliminated, and after removing the carbon deposit caused by the excessive oil supply, the knock will disappear also. It is the best plan to try them before beveling and boring holes in the piston. If you find that the

oil leaks into the explosion chamber after you have installed the new rings you may do as follows:

Turn or file a slight bevel around the shoulder at the lower edge of the lowest ring above the wrist pin and if there is a ring below the wrist pin, around this shoulder also. The face of this bevel should not be over 1/16 inch. Bore a series of holes, about one inch apart and 1/16 inch in diameter around the circumference of the piston along the bevel, through the piston wall to the inside as shown in the cut. If there is a pin holding the ring in place on the outside, do not drill a hole so near as to allow the pin to fall out. This procedure will allow the oil which is scraped from the cylinder wall by the stroke of the piston to flow back to the crank case through the holes drilled.

Excessive oil leakage into the explosion chamber may be traced to a number of things. It may be that the cylinder walls are scored. If this is the case, grinding may be resorted to and the cylinders enlarged. It is possible to have the scores filled up by a brazing process.

It may be that the piston is not large enough to properly fit the cylinder; in this case larger pistons will be necessary.

You may find that a heavier grade of oil will overcome the difficulty.

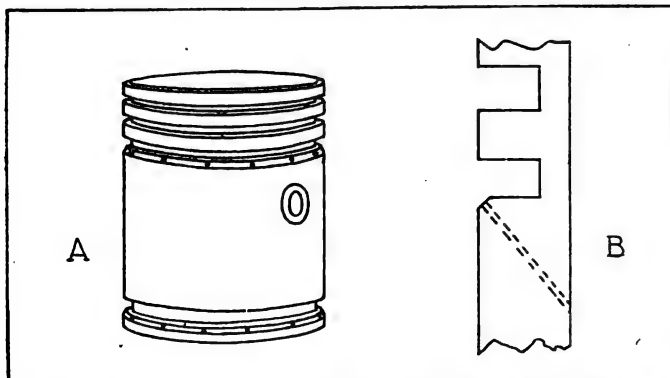
You say that the motor knocks. It is very doubtful that raising the cylinders will have any effect on this, and such a proceeding is not to be recommended. It is probable that the knock is caused by excessive carbon deposit in the cylinders, which is in turn caused by excessive oil supply in the explosion chamber. Cylinder knocks arise from a number of causes.

A loose cylinder or cylinder head will cause a knock.

A loose connecting rod or main bearing on crankshaft.

A loose flywheel knock is very hard to locate.

A loose wristpin will cause a sharp knock of a metallic sound very similar to a piston "slap," which is evident when the piston is too small and slaps against the cylinder wall at each stroke.



Illustrating Method of Boring Holes in Pistons for Draining Off Surplus Oil.

(When Writing to Advertisers, Please Mention The Automobile Journal.)

If the spark is advanced too far a knock will be heard.

A "rich" mixture often produces a knock.

There are a number of firms making engine governors at the present time, a list of such firms is attached.

Duplex Engine Governor Co., 245 W. 55th St., New York City.

The Gardner Governor Co., Quincy, Ill.

Kramer Governor Co., 1843 Mt. Elliott Ave., Detroit, Mich.

Pierce Speed Controller Co., Anderson, Ind.

A TROUBLESOME MAGNETO.

(R. L., Overbrook, Penn.)

My Ford 1914 car will not run on the magneto, but will run on dry cells. There seems to be plenty of spark at the brush. I have put in new coils, but it runs no better. It has no spark in front plug. Can you tell me what the matter is?

The first thing for you to find out will be whether the magneto is generating current. If you have electric lights on the car and they run all right on the magneto, then you may be sure that the magneto is generating. If not, then you may apply the following tests: Disconnect wire from magneto brush, which is found on top of flywheel case. Take a short piece of wire, scrape the insulation from the ends and make a connection between the brush and the base of the engine. This connection should give a spark if the engine is running and the magneto is in good condition. If it does give a spark the magneto is all right.

If it is found that the magneto is generating, disconnect at the battery and the wire leading from the coil to the battery, and connect it with the magneto brush. Turn the switch to the battery connection (just as if you were running on battery) and see if the engine can be started. If engine runs with this connection then the magneto is all right and it is the connections between the porcelain magneto terminal on the dash board and the coil switch that are at fault. If the engine does not run with this connection then the magneto is at fault.

If it is found that the engine will run with the magneto connected as above, then the trouble may be a loose or broken magneto wire, or faulty connections in coil box.

See that the porcelain plug on the coil box is firmly attached to the coil box and examine the inside of the box and see that all connections are tight. See that the magneto wire forms good contact with the plug. Put in a new magneto wire and see if it remedies the matter. You will note that when the coil units are removed from the box there is a contact on the bottom and two on the side of each unit; against these contacts a spring presses from the bottom and sides of the coil box. These connections should all be bright and clean and the tension of the springs should be strong enough to form good contacts.

It is possible that the wire leading from your magneto to the coil is broken inside the insulation, or that it forms poor contact with either the magneto brush or the porcelain terminal on the coil box.

If you have located the trouble as being in the magneto as directed in the first two paragraphs, remove the magneto brush and clean it thoroughly. This point frequently gets dirty from oil, grease and waste. It should be perfectly clean and form a good contact with the plate on the inside of the magneto. When this is done, replace brush and test magneto again as directed in first two paragraphs. If magneto is still at fault it may be that the magnets are demagnetized or that the coils are either broken or grounded.

The magneto must be taken from the case, the flywheel removed and the spools mounted on their plate when removed. To test the spools the following should be done only after the permanent horseshoe magnets have been removed, for if they are near the spools while the test is being made they are apt to get demagnetized. Run a light battery current through the spools, which is done by connecting one battery with the base of the spools and the brush plate. With a piece of steel test each spool for magnetism. A piece of steel should be attracted to every spool. If while the battery current is passing through the spools magnetism is not noticed in one or more of them, it is an indication that the current is grounded at one or more places between the spools

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If You Have Engine Trouble, Read This

WHEN the ignition system of an engine depends upon a battery, the possibility of trouble is evident—so much else depends on that battery, too.

Ignition should be alone, independent of all other units; it should be produced by a good magneto which performs no other function than producing reliable and efficient ignition. When you have magneto ignition, then and only then can you be free of puzzling ignition worries and starting difficulties.

Special Bosch Attachments for the installation of the reliable Bosch Magneto to replace ignition systems depending upon batteries or dynamos are now available.

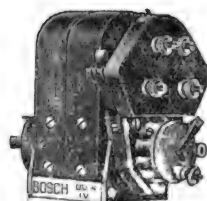
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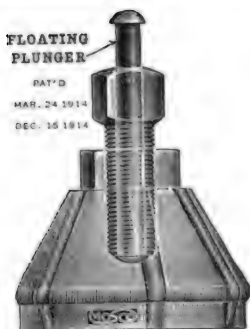
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TIMER FOR FORD CAR

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Terminals insulated all the way through. One-hand, self-closing oiler. Pressed steel arm and compression spring on brush assembly. Brush assembly can be had separate. Interesting prices.

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and the whole set must be replaced by new ones. The upper ends of every spool should be of opposite polarity from its adjacent spool. This fact can be determined by the aid of a compass. While the current is passing through the spools place a compass near the end of each, in succession; the opposite pole of the compass needle should be swung around as each successive spool is approached.

The permanent horseshoe magnets may next be tested with the compass in the same manner. Of course it will not be necessary to use the battery in connection with this test. In general, each small permanent horseshoe magnet should contain enough magnetism to hold a small pen knife; obviously, the more magnetism, the better it is. If it is found that the permanent magnets are demagnetized it is advisable to replace same by a new set from the factory.

In assembling the magneto, care should be observed that there is not too much clearance between the spool cores and the permanent magnets. This clearance should be about as much as the thickness of a business card. Each spool should be tested with each magnet on the flywheel.

You complain that there is no spark in the front plug. This may be due to any of the following reasons: A faulty plug, which may be determined by placing one of the good plugs from one of the other cylinders in its place and noting the result. If the cylinder then fires, put in a new plug, as it is not advisable to try to repair broken ones. A broken or grounded secondary wire, in which case replace the wire leading from the dash to the plug. The trouble may be from a broken or grounded wire leading from the dash to the timer. Oftentimes a wire breaks inside the insulation and is very hard to locate. By replacing wires by new and noting the result such a break is easily located.

The contact between the timer terminal and the wire should be clean and bright and free from dirt and oil. See that the timer terminals do not come into contact with any metal part of the engine. A broken or weak spring in the timer arm or brush will cause a cylinder to misfire. Test the coil unit by taking it from the coil box and coupling four batteries in

series; that is, the connectors from the positive (centre) terminals to the negative (side) terminals. To the centre terminal of the end cell and the side terminal of the other cell, connect two wires. Strip the ends of the wires of the insulation for a couple of inches and twist the ends into loops. When testing the coil unit place it on its side on a bench, box or floor. On the front or dash side of the coil will be found two brass discs or contact points, and on the bottom one contact disc. Place the unit with the lower of the two front contacts within 1/32 inch of a piece of steel or iron—a hammer head, wrench or any tool will serve. Touch one loop of the battery wires to the upper contact disc at the front of the battery and the other to the contact disc at the bottom of the coil and a spark will be formed between the lower front contact and the tool or piece of metal. The spark should be "fat" and white or blue. If you cannot get a good spark the insulation of the coil may be ruptured or the condenser may be damaged. See that you have no loose connections on top of the coil and no loose or badly worn platinum points.

If, after this test, you find that the coil unit will not spark, return it to the maker and have it replaced with a new unit.

WATER FOR STORAGE BATTERIES.

(B. H. P., Provincetown, Mass.)

Is rain water as good as distilled water for a storage battery?

Rain water should never be used as a substitute for distilled water in a storage battery; there should be no substitute.

The life of the storage battery depends upon the absolute purity of materials used. To introduce any foreign matter into the battery means deterioration of the elements used, and a consequent cost of replacement.

We do not feel justified in recommending any substitute for distilled water.

(When Writing to Advertisers, Please Mention The Automobile Journal.)

CONNECTING AMMETER TO BUICK BATTERY.

(E. R. V. R., Long Island City, N. Y.)

How may I connect an ammeter so as to show charge and discharge of battery on my Buick 1914-4-22 H. P. automobile?

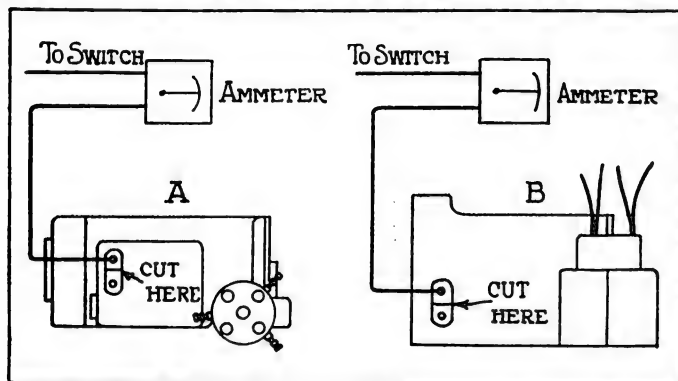
On either the top, near the back, as shown at A, or the side, near the back, as shown at B, of the motor generator you will find two terminals insulated from the motor generator frame, but connected with each other by a brass strip.

The connection between these two terminals must be broken, which is usually accomplished by sawing through the brass strip with a hack saw, taking care not to saw through the fiber insulation beneath the brass strip. On some of the motor generators of this same type there is also a brass strip on the inside of the machine itself. It will be advisable to try the ammeter as hereinafter directed before taking the motor generator to pieces, which will be necessary if there is a brass strip on the inside. All connection between these two terminals must be severed before the ammeter will register correctly.

From one of the terminals spoken of you will notice a wire leading to the switch. This connection is to be broken either at the switch, at the motor generator, or any point between, and the ammeter placed in series with the motor generator and the switch. Our sketch clearly shows this connection made at the switch end of the wire.

If you eventually find that you are obliged to take the motor generator to pieces in order to cut through the brass connection, which may be on the inside, the following advice may help you:

Before removing the motor generator from its position on the automobile, mark the gears with a punch or sharp chisel



Illustrating Method of Connecting Ammeter to Generator.

so that you will be able to replace same in exactly the same position as you found them. This also applies to couplings, etc.

The armature must be removed. This may be done by taking off the end plates from the motor generator. It is extremely important that every piece taken off be so marked as to insure its return to its original place and position. Note the location and position of brushes and springs; do not remove anything without first making a mental picture of its position and do not remove anything without first making sure that its removal is necessary.

Do not assemble motor generator without thoroughly cleaning every part of it of dust, grease and dirt. The commutator should be greased with vaseline by applying it to the commutator with one of your fingers, then rubbing off all the surplus. A very small amount only is required.

Grease the roller bearings with a heavy grade of grease. See that the commutator is not scored; if it is, take it to a machinist and get it turned off smooth.

Do not put the motor generator back upon the car until it runs smoothly and without friction. Do not turn the engine over while the motor generator is off the car, as doing so will alter the timing and make correct adjustment difficult even if parts are marked.

Every wire connection should be properly marked and replaced correctly. Make a pencil sketch of connections before breaking same.

Your ammeter should be of the "Zero" type; that is, a zero in the centre and graduations on each side of the zero mark.

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"I passed up common greases a long time ago. Haven't had a noisy, gritty gear since. NON-FLUID OIL'S my choice—*now*."

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Gets between the metal parts and keeps them **ALWAYS** apart. Never lets up lubricating because, unlike grease, it doesn't freeze. Neither does it melt and escape from where needed. With NON-FLUID OIL, gears and bearings are *always* being lubricated.

Ask your dealer for "K-00 Special" grade for gears—"K-000" grade for bearings.

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Heavy, Medium and Light

Automobile Oils

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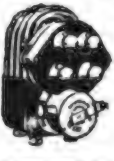
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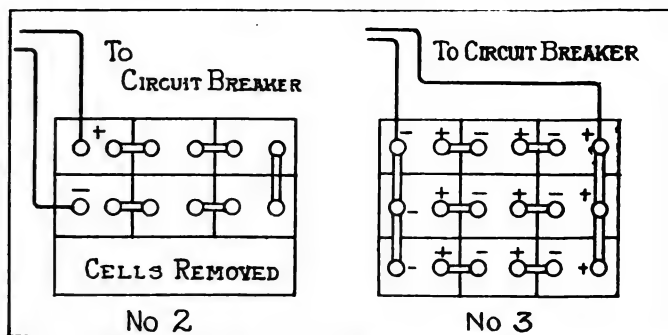
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Times Building PAWTUCKET, R. I.



No. 2, Wiring Diagram for Leece-Neville 12-Volt Generator.
No. 3, Wiring Diagram for Leece-Neville Six-Volt Generator.

One side of zero indicates "Charge" and the other side indi-
cates "Discharge," and if not so marked should be indicated
in some way so that you can read it properly at any time.

With ammeter properly connected, engine stopped and
lights turned on, the indicator will point to the maximum dis-
charge reading. With no lights on and the car running 15
miles per hour, the indicator will point to the maximum
charge reading. With lights on and the car running 15 miles-
per hour, the indicator will point to a slight charge reading
if the generator is giving its proper amount of current.

WIRING DIAGRAM FOR GENERATOR.

(H. D. H., Lyon Station, Penn.)

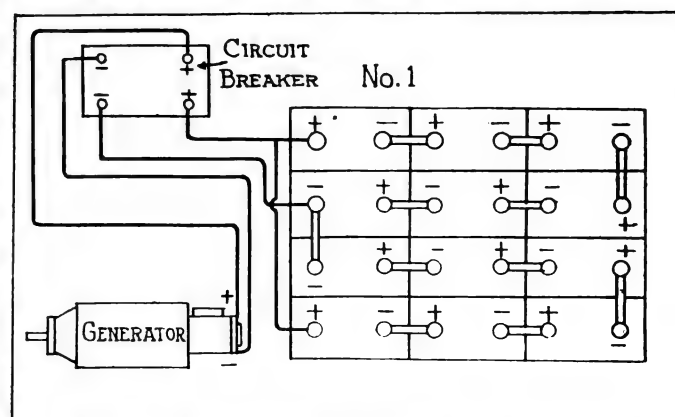
I should like to use a Leece-Neville generator for charg-
ing a U. S. L. 9 cell 18 volt storage battery. I should like to
run it from outside power. Will you please give me wiring
diagram and also tell me how fast to run the generator?

Your letter does not say whether the Leece-Neville gener-
ator is of the 1913-14 or of the 1915-16 type. The first men-
tioned generates 12 volts, the other six volts. As you say
that the generator was used for charging a 24-volt battery, we
will first assume that it was of the 12-volt type. We give here-
with a wiring diagram, showing the method of connecting
the generator with the circuit breaker (which must be used
in all cases) and the circuit breaker with the battery to be
charged.

The object of the circuit breaker is to protect the battery
from an overcharge and also to prevent the generator from
furnishing too much current.

As the generator furnishes 12 volts, it will not be possible
for you to charge but six cells at a time. You are given your
choice of two methods. We recommend the first: Connect
three additional cells with the extra three in the battery in
parallel with the other six cells. You will notice that the end
set of three cells has been turned in opposite direction so
that two of the negative terminals are together. Our sketch
clearly shows the whole set of connections and complete
marking of positive and negative terminals.

If you do not care to purchase an additional three cells,
three of the cells of the battery should be removed and stored
away as hereinafter directed. The remaining six are con-
nected as shown in the second diagram.

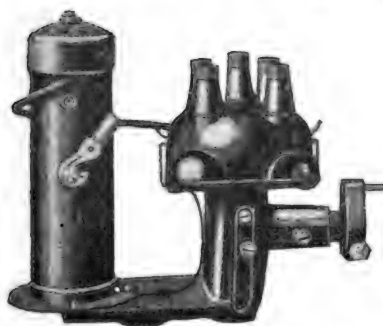


Wiring Diagram for Leece-Neville 12-Volt Generator.

(When Writing to Advertisers, Please Mention The Automobile Journal.)

ATWATER-KENT IGNITION

Type CC, Magneto Replacement System



For Four-, Six- or Eight-Cylinder Engines having generator and battery systems for lighting or lighting and starting. Is extremely simple and easily installed on Maxwell, Peebles, King, Metz and Overland chassis.

TYPE CC SYSTEM produces a uniformly intense spark at all engine speeds and affords greater power, increased flexibility, smoother riding, perfect acceleration and minimizes gear shifting.

This system is supremely simple, practical, foolproof, instantly accessible, and the single adjustment need be made but once a season. The only tool required is a screw driver. It will endure longer than the car.

WHEN ORDERING state the make and model of car, number of cylinders, and whether the magneto used rotates clockwise or counter-clockwise, seen from the coupling end of shaft.

List Prices: Four-Cylinder **\$18;** Six-Cylinder **\$20.** Weight when packed $8\frac{1}{2}$ lbs.

DEALERS—Important Notice: For cars not electrically equipped we make a special system that is very economical, operated by ordinary dry cells giving 2500 to 3000 miles.

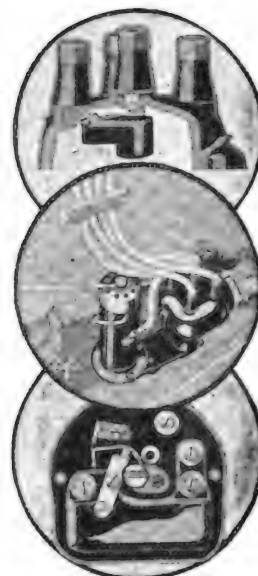
Detailed information, catalogues and trade discounts at request.

Atwater-Kent Sales Co. of New England
925 Boylston Street BOSTON, MASS.

The simple A. K. contact-less distributor. No rubbing surfaces or brushes.

Driver's-eye view of A. K. System installed on Maxwell Car.

Note the simple, accessible contact-maker of the A. K. System.



By properly connecting up a set of 12 cells as shown in cut No. 1, after they are charged you may obtain six, 12, 18 or 24 volts. As they are shown in cut you will obtain only 12 volts. It will not be practical for you to use only the nine cells, as the voltage output of the generator demands that the voltage of the battery being charged be 12 volts.

If the generator is of the six-volt type (1915-16), all of the cells of the nine-cell battery may be connected, as shown in cut No. 3. You will note that there is a change in the cell arrangement of this set also.

The generator shaft speed for the 12-volt type must be more than 430 R. P. M. and the maximum voltage is obtained at 800 R. P. M. (13 V. 12 Amp.)

The generator shaft speed for the six-volt type must be greater than 350 R. P. M. and its maximum speed is 650 R. P. M. We would suggest 600 R. P. M. in the first case (12 V.) and 500 R. P. M. in the second (six V.).

The size pulley to be used depends upon the size and speed of your driving pulley (the one on the power shaft). First determine the speed of the driving shaft; we will say for example that it is 300 R. P. M. Let us assume that the pulley on it is 12 inches in diameter. Then, as you wish the generator shaft to run 600 R. P. M., your problem would be:

$$\frac{12 \times 300}{600} = 6\text{-inch pulley on generator.}$$

In other words, multiply the diameter of the driving pulley by its number of revolutions, and divide the product by the required number of revolutions of the driven shaft. The result will be the diameter of the driven pulley required.

If you have no pulley on the driving shaft, but have a five-inch pulley on the generator, then

$$\frac{5 \times 600}{300} = 10\text{-inch pulley on drive shaft.}$$

In other words, multiply the diameter of the driven pulley by the number of its revolutions and divide by the number of revolutions of the driving shaft. The result will be the size of the driving pulley.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

Following are general directions for taking batteries out of commission: Charge the battery in the usual manner until all cells show a full charge. Disconnect cells and remove covers and elements and electrolyte. Slightly spread the plates at the bottom, withdraw the separators and pull the positive and negative groups apart. Play a gentle stream of water on them to wash off the electrolyte and drain and dry. The positives when dry are ready to be put away. If the negatives in drying become hot enough to steam they should be again rinsed or sprinkled with clean water and allowed to dry thoroughly. When dry, completely immerse the negatives in electrolyte of about 1.275 specific gravity and allow them to soak for three or four hours. Rinse with pure water, dry and put away.

USE OF CASTOR OIL IN AUTOMOBILE ENGINES.

(E. G. C., Newark, N. J.)

Would the mixing of castor oil with a high grade engine oil, say one to five, assist lubrication in a degree "worth while?"

We do not think that a mixture of castor oil and cylinder oil will assist lubrication to a degree "worth while." We doubt that the difference in the running qualities of the engine when using this mixture will be noticeable.

Castor oil is a high grade lubricant, and is used in aero-plane motors where it is desirable to get results regardless of cost. Being a vegetable oil, it contains a certain amount of acid, which will attack the metal portions of the engine, such as the walls, valves and rings, and cause corrosion. Such an action will not be found in the ordinary mineral cylinder oil.

BATTERY VS. MAGNETO.

(M. J. J., Powell, O.)

I am curious to know why so many manufacturers are building their cars to operate from the storage battery ignition instead of the magneto. Is it more efficient to operate from the battery? Are they dispensing with the magnetos in order to build the car cheaper?

ELCAR

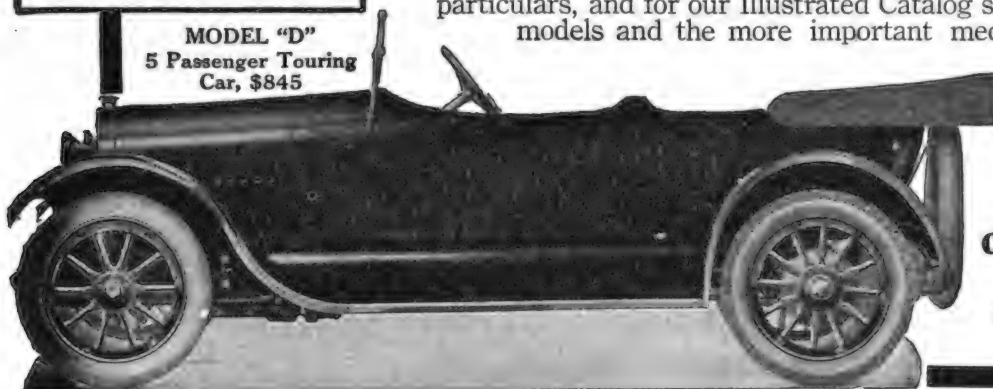
ELCAR

The Elcar at \$845 Does Its Own Talking

A Few Elcar Specifications

Wheel Base—As long as some cars selling up to \$3,000 and more—115 in.
Motor—4-cylinder; long stroke; high speed; 34.7 h. p. at 1,800 r. p. m.
Fuel Supply—Stewart vacuum system.
Ignition—Delco automatic spark advance with manual control.
Starting and Lighting—Dyneto two-unit; double-bulb headlights; Willard storage battery.
Clutch—Dry multiple disk—seven plates, steel on Raybestos.
Rear Axle—Full-floating with roller bearings at each end of wheel hubs.
Differential—Spiral bevel driving gears, with roller main bearings and ball thrust bearings.
Brakes—Internal and external, two inches wide on 12-inch drums.

MODEL "D"
5 Passenger Touring
Car, \$845



Looks better than its price, and is just as good as it looks. A car of distinctive beauty, well designed, well built, well finished—a car in which quality speaks right out.

Three Models at One Price

Five Passenger Touring Car Four Passenger Touring-Roadster
Two Passenger Roadster

Secure it for your territory

We want to place our proposition before live dealers in territory not already assigned. Write us for particulars, and for our Illustrated Catalog showing all ELCAR models and the more important mechanical parts, and describing the construction of the ELCAR even down to its small details.

**Elkhart
Carriage & Motor
Car Company**

6811 Beardsley Avenue
Elkhart, Indiana

The general tendency in the manufacture of present day automobiles is toward the storage battery and generator equipment for a number of reasons. A car to be up to date must be equipped with electric lights and engine starter. In order to run the engine starter and lights a storage battery is necessary if efficiency is considered. A generator is usually added to this combination, which charges the battery while the engine is running.

A magneto may be of the low tension type and require a coil to transform the current to high tension for ignition, or it may be of the high tension type, which has a transforming coil incorporated in the magneto itself; in either case it is nothing more or less than a simple generator, the output of which is used for ignition purposes.

It will be seen that if a car is equipped with a generator and storage battery a current is always available for ignition purposes, and that a magneto for ignition purposes will be unnecessary unless it is desired to have an auxiliary ignition system.

On cars equipped with such generators and storage batteries the magneto is frequently left off, both to simplify the electrical system by removing unnecessary units and to reduce the cost of the car. This is not arbitrary, however, as some cars retain the magneto and use it for ignition purposes.

The generator as a rule furnishes enough current to supply the lights and the ignition system while the engine is running, the surplus current running into the storage battery, where it is held as a sort of reserve supply to be used when the engine is not in operation, both for the lights and the engine starter.

TIMING OF JEFFERY 4-93 CAR.

(C. R. S., Saratoga Springs, N. Y.)

Will you please give me the correct timing for the Jeffery "47"

The flywheel is usually marked so that the position of the

(When Writing to Advertisers, Please Mention the Automobile Journal.)

pistons in the different cylinders can be located by reference to it. We give, however, the method for timing without reference to those markings.

The exhaust valve on this engine should open at a point 47 degrees before bottom centre. Locate the bottom centre of the piston in number one cylinder, then swing the flywheel back 47 degrees and mesh the camshaft gear with the drive gear so that the exhaust valve in number one cylinder is just about to open. To check up this timing see that the intake valve starts to open 18 degrees before top centre.

With spark lever set at full retard the engine should fire at top centre. With spark lever in that position turn the engine over until the piston in number one cylinder is at top centre on the firing stroke. Then turn the magneto shaft so that the breaker points in the breaker box are about to snap open and mesh the magneto gear with the drive gear. The breaker points should break at top centre. Let us add here that it is better to have the breaker points break slightly after centre, rather than before. You will find, however, that on your engine you will be able to set at top centre.

The firing order of the engine is 1-3-4-2. And the secondary terminal wires from the distributor box should be arranged accordingly.

When a part of a broken tap remains in the hole it ordinarily can be backed out by placing a small centre punch at the edge and striking it a light blow with a hammer. Should this method fail, select a bar of steel of about the same diameter as the broken section of the tap and drill out one end so as to form a shell. Three or four prongs can then be filed at the end. The projections are inserted in the tap grooves and by unscrewing the steel bar, the broken tap will generally be released.

Should the tap resist removal by this method, it must be drilled out. It will first be necessary to soften the tap. This can be accomplished by heating to a dull red and covering with dry sand to cool. A small drill is then run through the centre of the tap and the remaining metal chipped out.



Distinction in Your Own Car

If you give man his choice, he will reject the commonplace and select the distinctive every time. It's in the blood.

COVENTRY PATMORE, who wrote wisely of human life, said long ago: "The communion of men upon earth abhors identity (similarity) more than nature does a vacuum. Nothing so shocks and repels the living soul as a row of exactly similar things, whether it consists of modern houses or of modern people, and nothing so delights and edifies as distinction."

And what more delightful possession can one have than a distinctively individual motor car—a car designed precisely to your personal taste and embodying your own ideals of what a genuinely good car should be? You can make your wishes come true by ordering a Winton Six. Our artists are at your service, keen to create for your ownership an exceptional, distinctive, delightful private vehicle. Let us talk it over with you. Simply telephone or drop us a line today.

Open Cars

\$2685 to
\$3500

Closed Cars

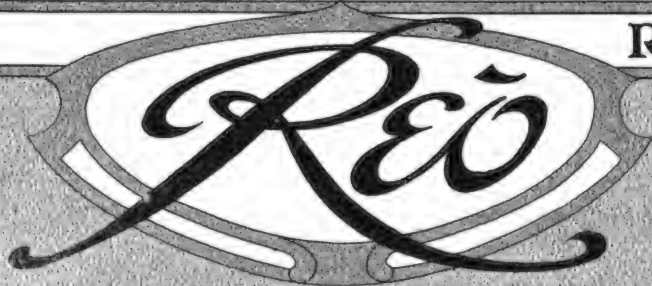
\$3000 to
\$4750

The Winton Company

131 Berea Road, Cleveland

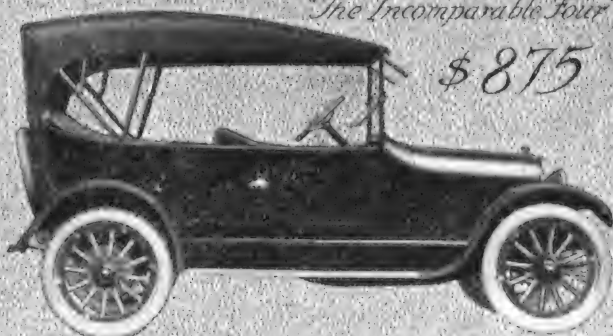


REO FACTORY FACILITIES~



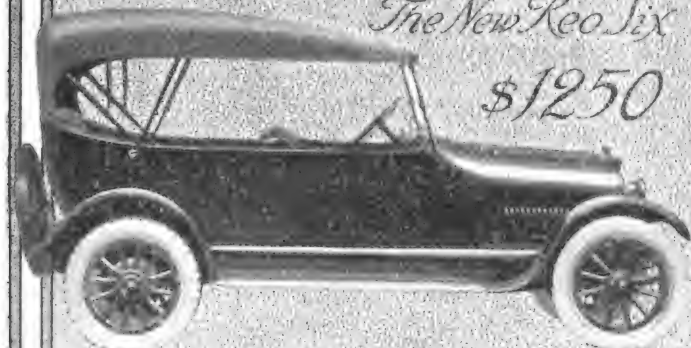
*The New Reo the Fifth
"The Incomparable Four"*

\$875



The New Reo Six

\$1250



All prices are f.o.b. Factory, Lansing, Michigan
and are subject to increase without notice

The "Open Door" Shops—

IF YOU COULD VISIT US at Lansing and spend a day or a week going through this big 40-acre factory, you'd learn more about Reo quality than we can ever hope to tell you in Reo advertisements.

FIRST, YOU'D GET ACQUAINTED with us Reo Folk—and we think you'd say after a visit that this organization is sincere and earnest in its desire to make, not the most, but the best automobiles and motor trucks.

THEN WE'D SHOW YOU through the splendid Reo laboratories where the Reo chemists and metallurgists analyze and develop and finally test all metals that go into Reos.

THESE LABORATORIES are unsurpassed by any in this industry—excelled by few, if any, in the world, in point of equipment and thoroughness of results.

OF COURSE YOU'D MEET the Reo engineers and body designers; and you'd find them not poring over new models, but seeking to bring to a point still nearer perfection, those Reo models that are already standard.

THEN YOU'D UNDERSTAND what now is so difficult to credit—the wonderful longevity and the low up-keep cost of Reos.

PROPOUND ANY QUESTION you like to these engineers and in the reply you'll find food for thought—and you'll agree that Reo engineering is sound engineering.

THEN IF YOU HAD TIME we'd take you through the entire plant—all units shown in the picture. It's about a 16-mile walk if you go down every aisle and see every operation.

AND EVERY FOOT OF THE WAY you'd find something interesting, something to approve—something that would indicate to you the quality that is Reo.

BUT IF YOU HADN'T more than a day to spend we'd show you only the major operations—

REO MOTOR CAR CO.

(When Writing to Advertisers, Please Mention The Automobile Journal.)



THE BASIS OF REO QUALITY

You Are Always Welcome

and you'd see some modern miracles of manufacturing.

WE CANNOT IMAGINE a more profitable day, or a more instructive ten days, than you could spend here in the Reo plants.

FOR YOU'D LEARN not only how good automobiles and dependable motor trucks are made, but you'd appreciate as never before what tremendous strides have been made in the past few years in the allied sciences of metallurgy and of manufacturing.

COME ANY TIME—you are cordially invited. Make the visit whenever best suits your own convenience—for we Reo Folk are always here—always the same—and always glad to meet any Reo owner, prospective owner or dealer.

FOR, BY THE WAY, the Reo Motor Car Company is owned and manned by home folk—Lansing folk. No absentee directors control this business.

ANY PROBLEM, no matter how vital or how trifling, can be and is, decided right here—and on the moment. The directors can be called into conference in five minutes.

PERHAPS that's another reason for Reo quality, Reo success. We think so.

THE FIRST IS Good Intent. Then comes Experience—oldest in the industry. Next, Intelligence—we may modestly claim this in the light of our success.

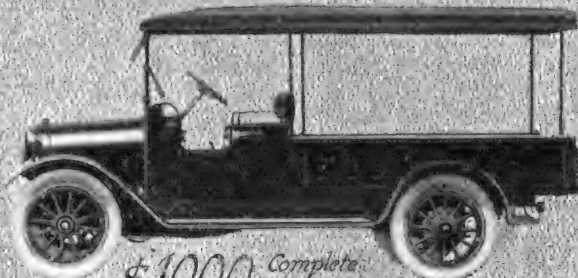
THEN FACTORY FACILITIES, second to none, which enable us to make every part according to the specifications and up to the standard set by Reo engineers.

AND FINALLY (or shall we reverse the order?) the fact that we can and do decide all questions right here and without red tape or delay.

COME AND SEE US. The latchstring is always out.

"THE GOLD STANDARD
OF VALUES"

*Reo 3/4-Ton
"Hurry-Up Wagon"*



*\$1000 Complete
as shown*

*Reo 2-Ton
Heavy Duty Truck*

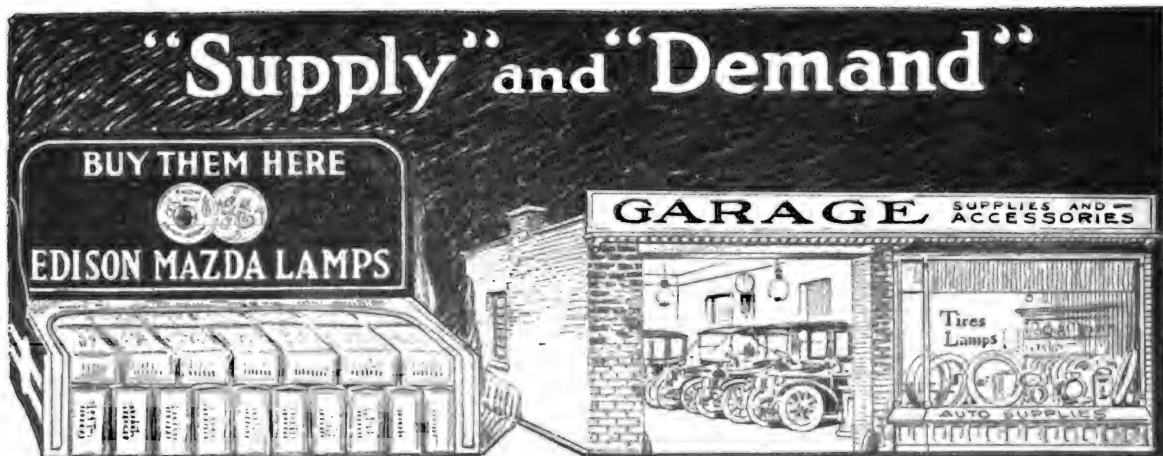


*\$1650
Chassis with driver's seat and cab*

All prices are f.o.b. Factory, Lansing, Michigan
and are subject to increase without notice

LANSING, MICHIGAN

(When Writing to Advertisers, Please Mention The Automobile Journal.)



EDISON MAZDA Automobile Lamp Assortment

Put this assortment on your counter or anywhere it will be seen and begin to do a business that will surprise you with its rapid and profitable turnover.

Here's an accessory that *has to sell*. The law says lamps—lighted lamps. This means new lamps for every motorist, now and then. Lamps get hard usage in automobiles.

The demand is steady and increases with every purchase of a motor car or truck.

Somebody in your vicinity has to supply this demand. Do you know that *you* can do it at an investment about equal to the price of a tire? You don't have to *sell* EDISON MAZDA

EDISON MAZDA AGENTS!

Write for new, 1917 Edison Mazda Auto Booklet, listing lamps for all makes and models of 1915, '16 and '17 cars.

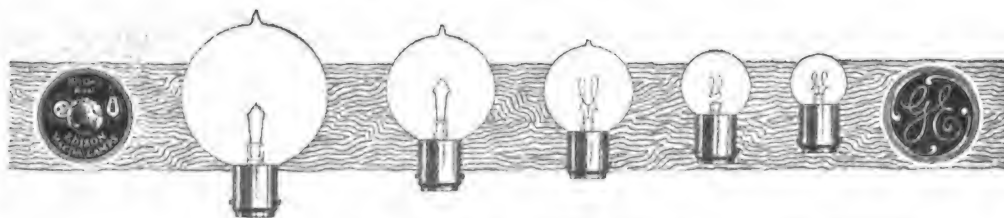
Lamps. They sell themselves wherever they're in sight. All you have to do is to hand them out—6 at a time—after ascertaining the make and model of your customers' car.

Your EDISON MAZDA Auto booklet tells you or your clerk at a glance exactly what lamps in your Assortment Stock are correct for his car. Your customers will appreciate this service. You can re-order automatically.

WRITE FOR AGENCY PLAN

EDISON LAMP WORKS
OF GENERAL ELECTRIC COMPANY
Harrison, N. J.

Sales Offices in Principal Cities



(When Writing to Advertisers, Please Mention The Automobile Journal.)



Free of Wax and Gum **Blue Ribbon Polish**

Is a standard product. Its superior quality is known of by automobile owners the country over. Being free of wax or gum it cannot coat the finish of a car nor retain grit or other abrasives that would destroy appearance. It penetrates and revives the finish, restoring its lustre, and it cleanses and polishes with the one operation.

It's an ideal compound. The results are certain. Other polishes may be destructive and quality is questionable until it has been proven by long service experience.

The cost of material, production and overhead have increased through the year. The quality, price and discounts to the trade of all Blue Ribbon products are unchanged. The profits are positive. Blue Ribbon products cost no more than stock that is inferior and unknown.

Those who sell Blue Ribbon products benefit directly through our high quality and low prices. Being prepared in sealed containers and fully guaranteed the jobber, dealer and consumer are absolutely protected. When you stock Blue Ribbon products you can supply any demand.

This entails a very moderate investment. There is constant sale and satisfied customers will increase your business.

*Have you listed Blue Ribbon products in your 1917 catalog?
If you do not know all about these specialties, write us today.*

INTERNATIONAL METAL POLISH CO.

INDIANAPOLIS

INDIANA

Blue Ribbon Specialties

-  **Blue Ribbon Cream Metal Polish**
For any metal.
-  **Blue Ribbon Black Enamel**
For Lamps, Hoods, Radiators and metal parts.
-  **Blue Ribbon Leak Proof Cement**
A Permanent Radiator Cement.
-  **Blue Ribbon Cold Cream Hand Soap**
Contains no pumice or sand.
-  **Blue Ribbon Auto Body Gloss**
For Automobiles and Furniture.
-  **Blue Ribbon Nickel Polish**
For Nickel Parts and Trimmings.
-  **Blue Ribbon Auto Top and Seat Dressing**
A Waterproof Dressing that restores Tops and Seats.
-  **Blue Ribbon Oil Soap**
A pure Vegetable Oil Soap for any purpose

(When Writing to Advertisers, Please Mention The Automobile Journal.)

NEW YORK

CHICAGO

CLEVELAND

BOSTON

DETROIT

Subscriptions:

The United States and Mexico, \$1.50 a year;
Canada, \$2.50 a year.
Foreign Countries in Postal Union, \$3.50 a year.

AUTOMOBILE JOURNAL

Remittances:

Should be made by Check, Draft, Postoffice or Express Money Order, or Registered Letter. Money enclosures must be at sender's risk.

Entered as second class matter, April 15, 1906, at the Postoffice at Pawtucket, R. I., under act of Congress of March 3, 1879.

Ten Cents
a Copy

THE Boston Automobile Show has come and gone, the great event to New England motordom, and of no small interest to the country at large. The Boston show is known to the trade as a "buyer's show," and this year's records give ample evidence that the classic event which has just passed into history far surpassed itself in its special characteristic. A very large number of sales are reported. The favorite color, outside of those chosen by the management for the decorative scheme of the halls, was the particular shade of yellow seen on the backs of United States \$50 bills. The existence of prosperity proved itself.

IT IS the wise buyer who has had the order for his new car in before this date. It is well for owners to buy their cars early, as the congested condition of the railroads does not seem to improve very fast. The freight situation may be expected to clear up somewhat with the coming of more seasonable weather, but there is no prospect other than unreliable conditions on the railways for some time to come. Those who buy their cars early have the best chance of getting them early.

THE official journal of the National Automobile Association, the continuation of which will be found in this issue beginning on page 23, is of interest to every motorist. Particular attention is called by the general counsel of the association to several phases of law which are often heard, but little understood. Elsewhere the association makes a decided pronouncement for the four-fold system of highways—national, state, county and town or township. There is nothing sectional about good roads, as their best friends see it. The times, the wealth of the nation, the progressiveness of the age, calls for good roads everywhere.

VOL. XLIII. MARCH 10, 1917. NO. 3.

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Treasurer . . . WILLIAM H. BLACK
Secretary . . . D. O. BLACK, JR.

Published the 10th and 25th of each month by the
AUTOMOBILE JOURNAL PUB. CO.
Times Building, Pawtucket, R. I.

AS THE Opening of the touring season approaches, the owner is liable to find there are a few kinks in his car which he ought to know how to straighten out, but doesn't. The Queries column contains many valuable hints to seekers for knowledge on specific points of difficulty. If there isn't an answer there to the specific problem, co-operation and help toward a solution will be given if a brief inquiry is sent in to this office.

NEXT to the printing press, it has been said by a recent writer, the automobile has been most revolutionary in its services to man. Now, in little distressed Belgium, the two are conjoined in a novel act of usefulness, according to reliable press information. Little newspapers are printed constantly in that occupied land, despite strict orders to suppress them. How it is done is a mystery to the military governor-general, although each morning a copy of one regularly appears on his table. It is said some of these clandestine liberty loving sheets are printed in cellars, with power obtained from the engine of an automobile.

AUTOMOBILE exports increased nearly \$13,000,000 last year, as compared to 1915. The value of this trade totaled \$138,289,514. In all respects this is to be considered an excellent showing.

OWING to the receipt of a number of complaints from subscribers that they have not received their copies of this magazine, or that the same arrived late, the editor especially requests that all letters of complaint be accompanied by the original subscription receipt. This will permit of more prompt attention to an adjustment of the matter, thereby insuring and facilitating a remedy of the trouble.

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are unequalled for motor lubrication, freer from carbon, economical because they protect the motor against mechanical wear, and the quantity required is comparatively small.

These are the claims of thousands of motorists,—some with years of experience, who want full value, and more who know the value of high grade lubricants, and who know when they obtain satisfaction.

EAGLEINE QUALITY IS INSURED TO YOU

A grade for every type of motor. It is sold in sealed containers.

*Let us send you our new book and chart.
It is free at request.*

EAGLE OIL AND SUPPLY CO.

44-45-46 India Street, Boston, Mass.

NEW YORK CITY
Woolworth Building

CHICAGO
1132 W. 37th Street

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UNIVERSAL TRUCK ACCOUNTING SYSTEM

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It affords every detail of time and work of any number of machines, the labor, operating cost, revenue and earnings, with comparisons for any period, in one record book and day card for each truck.

The simplest and most comprehensive record ever conceived, adaptable for use with any method of house bookkeeping or independently, that can be made to serve as part of any method of accountancy.

The most intensely practical system of accounting ever devised, that can be maintained by a girl clerk and which has no limitations.

When you know the exact cost of truck operation and what is earned through the use of any vehicle, you have data of the greatest practical value.

Detailed information at request. When writing state number of trucks in use.

The Motor Truck

TIMES BUILDING

PAWTUCKET, R. I.

MOTOR TRUCK

Construction

Operation

Maintenance

Repair

Care

PRICE ONE DOLLAR

A work that is complete, wholly practical and deals with all subjects as the title implies.

**Truck Care
Truck Repair
Truck Operation
Truck Maintenance
Truck Construction**

**Prepared for
Owners
Operators
Repairmen
Salesmen**

\$1.00 the copy. In combination with a yearly subscription to Motor Truck (the great national authority on highway transportation, issued monthly) \$2.00.

This is the only book published dealing with business wagons, it is fully illustrated and represents a wonderful value.

THE MOTOR TRUCK
Times Building Pawtucket, R. I.

The Test that Showed Over 59% Greater Gasoline Mileage With the *Wilmo Manifold*

Scene—Lincoln Park, Chicago. Date—Thursday, January 25th, 1917. Temperature—15 above zero. Road conditions—Ice and snow. Weather—"Blizzardy."

Present—Gathering of representatives of Chicago newspapers and national automobile publications. Their attitude—"Show me."

Car used—Ford, License No. 172017, Illinois. Owner—W. T. Magrane, 5704 Washington Blvd., Chicago.

Speed of tests 20 miles an hour.

Using regular factory equipment

only, 14 4-10 miles to the gallon were obtained.

Then a Wilmo Manifold was attached in a few minutes by means of an ordinary monkey-wrench.

With the Wilmo Manifold 23 miles to the gallon were obtained—a gasoline mileage increase of 59 6-10% as against the mileage made with regular equipment only.

Following right on the heels of other official tests made under the direction of L. A. Hillman, Chicago, technical representative of the American Automobile Association, and which showed an increase in gasoline mileage of 42% to 54% as a direct result of Wilmo Manifold efficiency, this "newspaper man" test has an added appeal to you as an automobile man.

Shorn of details, the Wilmo Manifold utilizes the heat of the exhaust gases to superheat and completely

vaporize the incoming mixture so that every vestige of gasoline is converted into clean, full-bodied power.

And in addition, practically all carbon troubles are eliminated. The diagram below tells the story.

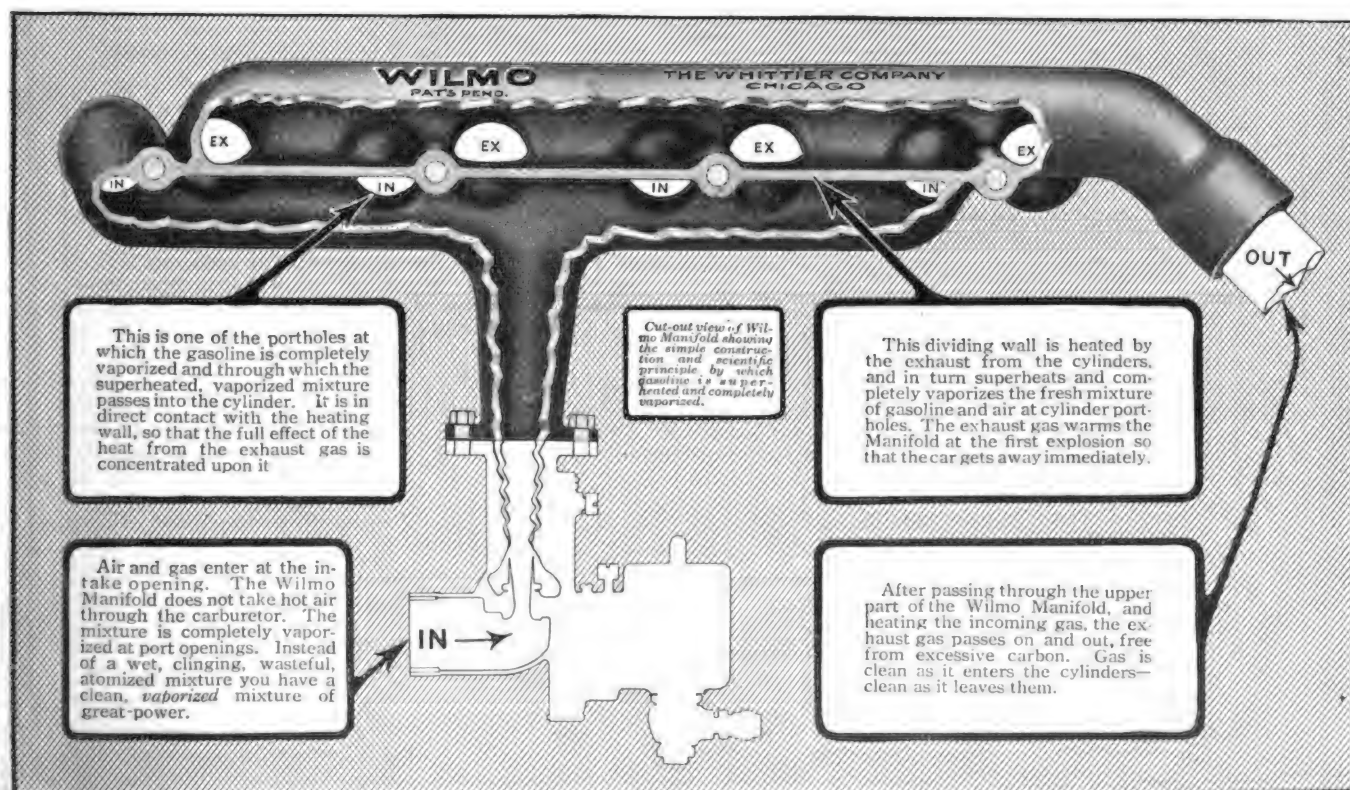
The Wilmo Manifold is being nationally advertised in the country's foremost publications. Sales are made through dealers—through you.

Retail prices, \$7.50 to \$15, depending on the make of car.

Attached to the engine in thirty minutes with a monkey-wrench. No holes to bore.

A year 'round seller. A money maker and prestige builder for you. Write today for all official tests, prices and dealer plan.

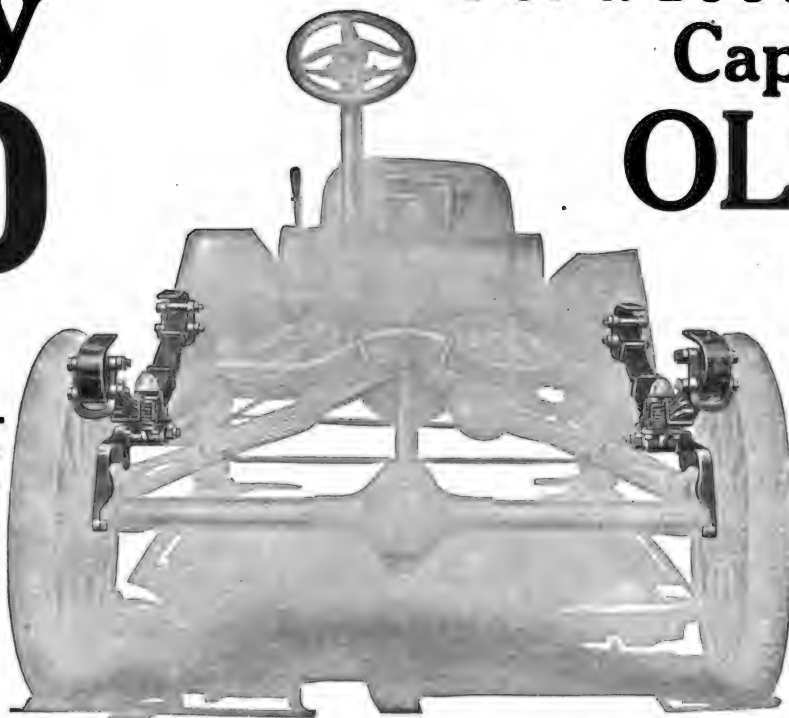
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For a 1000-1500 lb. Capacity OLSON Unit For Fords



**OLSON
1000-lb.
Capacity
UNIT**

**Attached
To a Ford
Chassis**

**For 1000 lb-Loads
5 Leaves**



**For 1500 lb-Loads
7 Leaves**



Saves So Much That It Sells On Sight

Thousands of farmers, grocery men, butchers, delivery firms, draymen, retailers—business men in nearly every field, have use for a 1000-lb. to 1500-lb. capacity motor truck.

Their requirements are a reliable truck—always ready to go, and carry its load.

These men are prospects for converted Fords. How the Ford is converted they don't care—as long as it gives service.

How much it costs they do care. Thousands of them will pay \$30 for an OLSON Unit—thousands who are not even prospects for other units that serve them no better than the OLSON Unit, but cost 10 times as much.

Price—saving—service sell OLSON Units on sight. They sold at the rate of 1000 a month for 10 months before they were advertised. They are

going faster than that now, with our big advertising drive behind them.

Get out and show the OLSON Unit. Attach one to a Ford chassis and demonstrate in your territory. \$30 makes sales, where \$350—what some other units cost—fails.

The OLSON Unit is attached without removing a single member of Ford construction. It deflects the load direct to the wheels where it must ultimately be carried, instead of conveying it through the frame, springs, axle, differential, etc. This makes the simplest, cheapest, most efficient attachment for the Ford delivery car.

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THE Automobile Journal

VOL. XLIII.

MARCH 10, 1917.

NO. 3.



The Grand Hall at Mechanics' Pavillion.

Hub's Big Show Prospers in Prosperity

Is Readily Classed as Completest and Largest Exhibition of Automobile Products—Stages Overflow Exhibition and Its First Salon—Distinguished by Presence of a "Buyer's Crowd"—Car Accessories Attract Attention

IN RETROSPECT, a study of the Boston Automobile Show, which closed on March 10, reveals as the most salient feature the fact that it was, as a whole, the most comprehensive and largest exhibition of automobile products ever held in the world, and, furthermore, that the attendance and sales reported indicate that the coming season in New England automobile trade circles will eclipse all previous records.

It was not a one line show, but included the products of all the branches of the motor car industry, pleasure cars, commercial vehicles of all sizes from light delivery wagons to trucks of seven tons capacity, trailers and an extensive line of equipment and accessories. The main show, as usual, was staged in the

Mechanics' building, on Huntington avenue, with an overflow exhibition in Horticultural Hall. The Boston auto dealers also inaugurated their first Salon, exhibiting over 23 different high class cars in the ball room of the Copley-Plaza Hotel. This latter exhibition, however, was held separately from the main Boston show, although also under the management of Chester I. Campbell.

It would be impossible to generalize with descriptive terms fitting any particular trend of body type or finish as indicated by the car exhibits. While it might be said that the stream line idea is being adhered to as a rule this year among the majority of manufacturers, there are so many elaborations upon this type worked out in the new bodies and

so many strikingly original designs that innovation is the principal characteristic of the year rather than any definite trend. This is also true of colors and interior finishes, which are more elaborate and luxurious than ever before. No one model could be singled out as representing the ultra type of luxury in finish and appointment, as there are a dozen or more cars on exhibition that seemed to embody the very last limit of skill in the body designer's art.

In limousine types, which are officially defined as being closed cars, seating three to five inside, with the driver's seat outside and covered with a roof, one finds examples of the coach builder's art that have attained remarkable perfection. There are several elaborations

upon this type, including the open limousine, the Berline, brougham and landaulet. The open limousine, as its name implies, is a limousine type with permanent standing top and disappearing or removable glass sides, while in the Berline we find the compartment extended to enclose the driver's seat. The brougham is the limousine with the roof extending only to the back of the front seats, while the landaulet might be described as a collapsible limousine, having a folding top, with seats for three or more inside and the driver's seat on the outside.

Body designers, however, do not adhere even closely to the definitions of type, but are given a free rein to create distinctive shapes, appointments and equipment, with the result that in many cases it is quite difficult to define correctly the status of a car in the official body nomenclature. With this wide variety of products from which to select,

From a mechanical viewpoint the exhibits present the same heterogeneous aspect as they have at all shows for the past five years since manufacturers commenced deserting the four-cylinder engine for the multi-cylinder product.

If one were compelled to recognize some predominating characteristic of the show, the first thought would probably be that inspired by the wide variety of body designs and the fact that most every manufacturer has added the all-weather car to his line, making the automobile an all-year-around proposition instead of a fair weather vehicle. The buyer was never before offered so many different types of bodies from which to choose, both on the luxurious as well as the medium priced cars.

As indicated by the exhibits and catalogues distributed, manufacturers have recognized the value of having a big line of bodies, as they are now marketing their cars with from six to 20 different

or more persons with direct entry to the tonneau through rear doors. With a passage between the front seats in this type, with or without doors entering direct to the tonneau, it becomes a salon touring body and through the addition of the folding top and disappearing or removable glass sides it becomes a convertible touring car.

Coming down to the enclosed types, the sedan probably enjoys greater popularity than any other design, as it has a very chummy atmosphere on the inside, as it is equipped to seat four or more in one compartment, and is with or without separate entrance to the front seats. There are also the convertible sedan bodies, which are so named from being formed by the attachment of a detachable sedan top to a salon touring car.

Many manufacturers continue to cling entirely to the four-cylinder engine, others make both four and sixes, while others are confining themselves to sixes, eights or twelves, exclusively. One marked tendency is the trend toward lighter engines, including lighter moving parts. Two companies, the Premier and Marmon, have incorporated aluminum motors in their cars, while many makers have fitted their engines with lighter piston rods and connecting rods, their use being made largely possible, and practically through the counter balanced crankshafts that are more extensively used this year than ever before.

Sixteen-Valve Fours.

Another conspicuous feature which attracted more than passing attention among those visitors who give a car more than a superficial examination, were the four-cylinder motors with 16 valves, each cylinder having two exhaust and two intake valves. This feature was found on two makes of cars and it is claimed that by thus increasing the valve area a more efficient and smoother running engine is obtained.

The overhead valves seem to be gaining prestige, which fact, together with the others mentioned, generally covers the development of motors for the year as indicated by the exhibits. The vacuum gasoline feed has become standard equipment on many makes and quite a number of cars have the emergency brake applied to a drum on the transmission shaft.

There were two steamers at the show, the Stanley and the Doble, the latter being a new product first introduced to the public at the New York show, and for that reason created intense interest. The many special features about this car, differing considerably from general practice in applying the steam engine to the propulsion of a motor car, also earned for it much attention.

The Doble car is not only striking in appearance, resembling in every respect a high class gasoline car, but it has an operating radius of over 1000 miles on one filling of the tank of water, which holds 20 gallons. This is accomplished by a very efficient condenser in the form of a radiator similar to that used in the cooling system on a gasoline car. Through a special lubrication system the



Boston Show's First Salon—Copley-Plaza Exhibit.

it would seem that the most fastidious buyer could be easily suited. The manufacturer, however, takes no chances in most cases of not having his product come up to these exacting requirements, but stands ready to make to order almost any type of body desired. Many of these special bodies were shown at the show and they make a strong appeal to the man who wants individuality in his car, and one that embodies one or more of his own ideas of finish, appointment or equipment.

In inspecting the new body creations one cannot fail to be impressed with the extensive amount of thought and labor that has been spent in perfecting the convertible and enclosed models. Comparing them with those shown several years back the latter appear as makeshifts, admitting the wind, snow and rain as they did at many points, while the new creations are fitted with windows, panels, curtains and tops which indicate great ingenuity in their design.

body types. There are roadsters seating from two to three, with additional seats in some cases on the running boards or folded under the rear decks. This same type becomes a coupelet when fitted with folding top and full height doors, with disappearing panels of glass. The next in order and of kindred design is the coupe, which is operated from the inside and which seats from two to three, with a fourth seat sometimes added facing the rear, and this is called a convertible coupe when it is formed of a roadster with detachable coupe top. Another development of the roadster type which has become very popular is the clover leaf, which is an open car seating from three to four with a rear seat close to the front seats and accessible only through a front door and aisleway between the front seats.

The touring car type of body which is so well known, has under gone many refinements and improvements, but elementarily it is an open car seating four



Aisle of Greeting, Just as One Entered the Show.

car can be run 8000 miles on one gallon of lubricating oil, the lubricant being poured into the water and worked through the boilers and engine in the steam.

Kerosene is the only fuel used and it is ignited in the combustion chamber by a spark plug. It is claimed that the car will go from 14 to 15 miles on the consumption of one gallon of kerosene. The car has many other remarkable features described elsewhere in this issue.

Largest Single Exhibit.

The Metz company of Waltham, Mass., had the largest exhibition at the show, the setting of over 20 machines occupying an entire auditorium which was known as Metz Hall. Another feature of this exhibit was the staff of 30 lady attendants. All the Metz models were on display, including roadsters, touring cars in different colors and a line of commercial vehicles, including the one-ton high duty truck. The Victoria model was the centre of the display and shared the bulk of the attention with the two stripped chassis at either end of the hall.

Another New England product, the Lenox Six, made by the Lenox Motor Car Company of Boston, was naturally of more than passing interest, as it was not only the only car in the show that is made in Boston, but was being exhibited at the show for the first time. The five-passenger touring car is the standard type with an Amesbury body elegantly finished and the most complete and up-to-date equipment.

The Pierce-Arrow exhibit by the J. W. Maguire Co. of Boston was one of the most striking at the show, the body interiors and exterior finishes presenting exquisite taste for artistic luxury. The latest Pierce-Arrow creation, a 48-horsepower, four-passenger roadster, is unique in design, having a larger seating capacity than the conventional car of its type, yet in appearance resembling a runabout instead of a touring car. The body is close coupled with divided front seats and three doors, two in front and one to the right side in the rear. Brown crushed grain Spanish leather is used in the upholstery and it is finished in tan with a stripe of French brown edged with moss green.

In the Pathfinder exhibit of Harry Fossdick, Inc., was found what could be pronounced without contradiction the most novel body design. It was shown in a seven-passenger touring roadster and embodied a disappearing and enclosed top and revolving, concealed tire carrier. These two features are made possible by an extension of the body at the rear forming a compartment along the sides and back in which the top and bows are housed and completely concealed by a snug fitting cover. Beneath this extension the room is utilized by the installation of a circular carrier for holding two tires which not only keeps them from the weather and dust, but also lowers the centre of gravity.

The stripped Premier chassis at the show, in the Cutler-Hammer electric gear shift equipment, had a feature exclusively its own, and was consequently the centre of a continuous gathering which listened intently to the attendants' explanation of the operation of the device, which takes the place of the "H" sector and levers usually used in shifting gears by hand. It is operated by four push buttons in a switch box placed on the steering column just beneath the wheel

and handy to the driver's right hand. By pressing the proper button the desired gear change is brought about electrically, relieving the operator of the manual labor that so often deters him from making a necessary shift of gears when driving conditions warrant it.

A second New England made car making its debut at the show this year is the American Six, which was exhibited by the Fred S. Smith Co., Boston agents. Louis Chevrolet, the former racing driver, is the designer of the American, which is made by the American Motors Corporation in its plant at Norwalk, Conn. A feature of the construction is its strength throughout, and exceptional riding qualities are assured through long, under hung, self-snubbing rear springs. Its most novel feature is in the arrangement of the instrument board, which is in a unit and also carries the fuse of the electrical system. When this is removed, by detaching four bolts, the entire body can be removed from the chassis and run independently.

More Accessories Shown.

The exhibition of automobile accessories was larger and more comprehensive than in previous years, there being about 170 stands in all. Practically all of the manufacturers of automobile and garage equipment were represented through dealers at the exhibits on both balconies of the main hall and in Horticultural Hall.

The display of the Sexton Oil Co., which was called the fountain of "Motor Youth," was one of the most attractive among the oil exhibits, being formed of a series of bowls over which the oil was kept running and through which lights were shown from the inside.

Sternwear tubes, exhibited by the Sterns Tire and Tube Co., were among the most popular novelties in the accessory department, as they are designed for use in either new or old casings without danger from blow outs and are almost strong enough to be used as a tire alone, so great is their strength.



A Prominent Aisle, with Maxwell and Apperson Exhibits in Foreground.



Central Point in Accessories Exhibit—A Very Popular Place.

The United Chemical Co.'s attendants were kept busy at their stand demonstrating the properties of their polishes and cleaners and in the same section of the hall the Texas Co. had an extensive array of its products and the G. H. Dyer Co. oxy-acetylene welding and cutting apparatus, carbon burning attachment and acetylene heated soldering iron, also interesting tools and reamers for the repair man.

Polish and Cleansers.

Many people gathered about the demonstration of Victrolene, an automobile polish, which was given at the booth of the Victrolene Co. This polish removes the dust and dirt from the enamel of the car, restoring its lustre without scratching the surface. The Hires Turner Glass Co. demonstrated its product, Super-Glass, which is designed for use in windshields and automobile windows and panels. It is made of two sheets of plate glass with a centre sheet of celluloid, all fused together under enormous pressure and forming a solid sheet that while transparent will not break through or splinter even under the blow of a hammer.

A demonstration of U-Sav-Your Mfg. Co.'s automobile polish and cleanser was very instructive, and the display of accessories by the Boston Starter and Specialty Co., including the Stanwood Safety Step Plates, Boston Starters, Branford Carburetors and tire tools.

The Atwater Kent Sales Co. displayed the new A-K product, an ignition system for the Ford car, in a number of types, and the Aerofram Co., Inc., had a varied exhibit, including the Aerofram gas savers, the well known Rand Reflectors, a Nu-Way Button for the centre of a Ford steering wheel and a novelty battery connector.

Pumping apparatus, lubricating oils, kerosene and gasoline, and other Standard Oil products made up that company's exhibit, and the New York Lubricating Oil Co. displayed their line of Monogram Oils and Greases. Craig-Wyman Co. featured the Gill piston rings, Boice-Perrine Co. exhibited General Electric Starters and U. S. L. Batteries.

Pettingell-Andrews Co. showed the famous Everready products, the Genolite

electric lighting equipment for Ford cars and "Old Sol," a well known spotlight, and the W. J. Connell Co., in their exhibit displayed Gabriel Snubbers, together with a number of other popular car accessories. The Legalite Lens, which keeps the light from the headlights within the focus prescribed by law, was exhibited by DeLano & Harriman.

Bosch electrical products and Zenith carburetors were shown by the Motor Parts Co., and the Boice-Perrine Co. displayed Rayfield carburetors. The Hi-Lo Jack Sales Co. had a display of their product, horizontal screw jacks, and the Naillik Motor Signal Co. demonstrated a signal hand which is attached to the rear or front and is operated by a button from the driver's seat.

The Eagle Oil & Supply Co. had an extensive display of Eagleline motor oils, greases, polishes and packings, and the Barnstead Still and Sterilizer Co. demonstrated its still for distilling water for storage batteries. An exceptionally complete line of automobile lamps and electric specialties was shown by Holt & Beebe of Boston, including the many new shapes for interior and outside lighting, auxiliary to the main lighting system.



Cars in the Big Exhibit in Metz Hall.

In Horticultural Hall there were about a dozen accessory exhibits, prominent among which was that of the American Bureau of Engineering, where the Ambu Trouble Shooter was demonstrated. This device has been changed since last year, the wiring diagrams and directions are issued in book form instead of as card indexes. The National Rubber tire filler, exhibited by the New England Equipment Co. as pneumatic tube substitutes, attracted much attention, as did also Virgil D. White's exhibition of an attachment for Ford cars for driving in deep snow. The Holland Trailercar, shown by the Holland Trailer Corp., was another feature of the accessories at the Horticultural Hall.

H. T. DUNN RESIGNS FROM WILLYS-OVERLAND OFFICE.

Harry T. Dunn of Springfield, Mass., president of the Fisk Rubber and Federal Rubber companies, has resigned the vice presidency of the Willys-Overland Company of Toledo, O. It is understood that he will retain his position on the board of directors of the automobile company, but will devote most of his time to the two rubber concerns of which he is the head.

E. H. Broadwell, vice president of the Fisk Rubber Co., in speaking of Mr. Dunn's resignation, said: "His decision to resign his connection with the Overland company comes as a result of the great expansion of the business of the Fisk Rubber Co. and of the Federal Rubber Co. as well. He finds it necessary to devote his entire time to those interests or to the Overland company and naturally chooses the former."

ONEIDA MOTOR TRUCK CO., GREEN BAY, WIS.

The Oneida Motor Truck Co., Green Bay, Wis., recently organized with a capital of \$300,000, has acquired factory facilities for the manufacture of 1, 1½, 2 and 3½-ton trucks.

Hearty Greetings at the Boston Dinners

Governor, City Officials and Prominent Manufacturers Take Part in Round of Social Functions Which Make Advanced Record at the Hub Show—New England Trade Conditions Discussed.

THE social side of the Boston Automobile Show was marked with more activity than in previous years and was on a scale that vied in scope with that in connection with the



J. J. Cole, President of the Cole Motor Car Co.

New York and Chicago shows. Of late years it has become a general custom to have gatherings, conventions and banquets during show week, which are attended by the different men in the trade. This serves not only to create enthusiasm among the salesmen and distributors, but strengthens the spirit of co-operation which is so essential in an efficient sales organization.

State and city officials participated in the functions that were held in Boston, as did also many prominent men in the automobile industry. Governor Samuel W. McCall of Massachusetts attended the Oakland dinner given at the Hotel Lenox by L. B. Sanders, and President J. H. MacAlman of the Boston Automobile Dealers' Association was also a guest. Oakland dealers from all over New England were present and enjoyed the banquet, which was followed by an entertainment, consisting of a number of high class vaudeville acts.

One of the largest social gatherings of the week, which was marked with a banquet, and which was also held at the Hotel Lenox, was that of the Studebaker dealers of New England. There were over 250 dealers, salesmen and factory officials present, including L. J. Ollier, vice president and director of sales of the Studebaker Corporation; Joseph Donovan, the Boston distributor; George

N. Jordan, the New England wholesale man; E. R. Benson of Maine and Henry T. Myers, manager of the commercial car department.

The principal feature of the gathering was the address by Mr. Ollier, who spoke on the future of the industry and said that war or no war, there would be a wonderful prosperity. He also spoke of the Studebaker plant and of its capacity for producing quality cars in quantity. Messrs. Donovan, Benson, Jordan and Myers also talked on sales conditions in the New England territory.

E. C. Morse, the new vice president of the Chalmers company, was the guest of honor at the Chalmers dinner held in the Hotel Lenox, and W. J. Drumpelman, general sales manager, and O. L. Halsey, head of the New England Chalmers company, also participated in the festivities.

Dealers from all over New England were present and a reception was held, during which they were introduced to the factory officials by Frank Allen, who presided. Mr. Drumpelman, the first speaker in the after dinner session, explained the present situation at the factories resulting from the disturbed economic conditions, including the high cost of materials, labor and product, and the freight car shortage. Mr. Morse dwelt upon the dealer's relation with the factory and spoke of the company's organization and how it was co-operating with the distributors throughout the country.

Mr. Halsey, in the course of his re-



M. L. Pulcher, Vice President of the Federal Motor Truck Co.

marks, thanked the New England dealers for their loyalty and the factory officials for their valuable co-operation. F. S. Sumner, the next speaker, told of the increased volume of sales in the territory



E. C. Morse, New Vice President of Chalmers Motor Car Co.

and stated that the dealers were all satisfied with what had been accomplished.

President B. W. Twyman of the Interstate Motor Co., Eastern Sales Manager David W. Hill and Harry Knippenberg, and Messrs. Vincent and Raymond of the Boston Interstate Co., were all present to greet the New England Interstate dealers at a banquet in the Lenox during show week.

President Twyman outlined the Interstate policy, speaking of the design and construction of the car, the sales plan, what is meant by service and what constitutes real value in a car. Sales Manager Hill spoke of the business in the territory and Harry Knippenberg outlined the advertising policy.

Mayor James M. Curley of Boston was the principal guest at the Maxwell dinner, which was attended by upwards of 300 dealers from various points in New England. Particular interest was attached to the mayor's presence, as it was he who recently officiated at the starting and stopping ceremonies in connection with the non-stop run made by the Maxwell car in Boston. Hoover Holton, New England Maxwell manager, introduced the mayor as the first speaker after the banquet. In the course of his remarks the mayor showed a surprising knowledge of the affairs of the Maxwell com-

pany and organization and paid the officials a high compliment. Brief addresses were also made by T. J. Toner, director of sales, and Charles Gould, head of the service department of the Maxwell Motor Co. of Detroit, Mich.

One of the most enthusiastic meetings and dinners of the week was that of the Cole Motor Car Co.'s sales force, which was attended by J. J. Cole, president of the Cole Motor Car Co., Indianapolis, Ind., and General Sales Manager A. F. Knoblock, and W. L. Colt, eastern sales manager. The tone of the speeches was of a very optimistic nature and it was the unanimous opinion that the Boston show had given a strong momentum to the selling season in the New England territory.

M. L. Pulcher, vice president of the Federal Motor Truck Co. of Detroit, was host to a party of over 200 dealers and representatives of the Federal truck in New England at a banquet in the Lenox. J. F. Bowman, director of sales of the Federal Motor Truck Co., Field Sales Manager H. A. Conlon, Advertising Manager L. B. Dudley, Service Manager E. A. Huskins, New England Sales Manager A. A. Gensel and District Manager W. S. Hill were present, representing the company. G. B. Chapman and Martin Carney represented the Boston agency. C. E. Whitten of Lynn and many distributors from other points in New England were present.

An innovation was introduced in the form of the menu cards, which were an announcement of the complete line of models, one to five tons that the company is now making.

PIERCE-ARROW SELLS \$10,000,000 STOCK.

The \$10,000,000 issue of eight per cent. cumulative preferred stock of the Pierce-Arrow Motor Car Co., which was sold to J. & W. Seligman, has been placed

SOME FIGURES OF THE BIG BOSTON SHOW.

The magnitude and scope of the Boston Show, speaking of it as a whole and including the exhibits in all three buildings, is readily indicated by the following figures:

Estimated value of exhibits	\$2,000,000
Attendance	300,000
Cost of staging show.....	\$75,000
Dealers and salesmen attending	5,000
Total number of machines exhibited	512
Accessory and equipment exhibitors	170
Makes of cars shown.....	90
Makes of trucks shown...	49

among private investors. This issue is redeemable at the option of the company on any dividend date on 60 days notice at 125 and accrued dividend. The par value of the stock is \$100. An issue of 250,000 shares of common stock of no par value has also been authorized.

J. J. HARRINGTON NEW FORD MANAGER IN BOSTON.

J. J. Harrington, formerly assistant to N. A. Hawkins, sales manager of the Ford Motor Co. of Detroit, has been appointed manager of the Ford branch in Boston, Mass., to succeed Charles E. Fay, who resigned last week after 11 years service with the Ford company in that city as manager.

COOPER WINS RACE AT ASCOT SPEEDWAY.

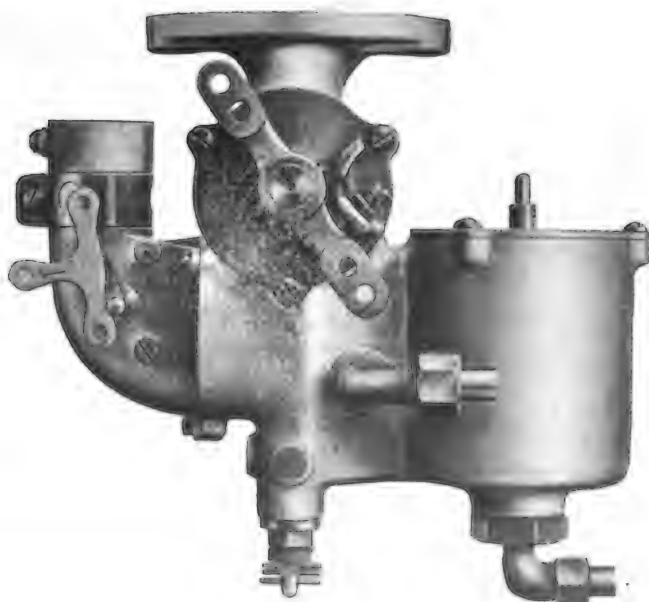
The George Washington automobile sweepstakes race at Los Angeles, Cal., on March 4 was won by Earl Cooper in a field of 11 starters.

MYERS VICE PRESIDENT GENERAL ENGINEERING CO.

T. P. Myers, the new vice president of the General Engineering Co., makers of the Doble car, has had one of the most spectacular careers of the many young men who have risen to prominence in the automobile industry. He joined the company on the first of last December as sales manager of the truck department and was made general sales manager of the company on the first of the year. The latter part of January he was made a director in the company and as a result of his phenomenal efforts in establishing a sales organization that practically covered the country, he was made a vice president of the company last month.

Twenty years ago, when he was but 13, Mr. Myers left his home in Kentucky and went to Kansas City, where he became a messenger boy. The next 10 years of his life were spent in drifting about the country and during that time he visited many parts of the United States and engaged in many different business ventures. At the age of 25 he was sales manager of the General Motors Truck Co., and five years later was president of one of the subsidiaries of the Willlys-Overland Co. He left that position to become general manager of the New York district of the Packard Motor Truck Co., with which concern he was associated until last November, when hearing of the new Doble car he immediately became convinced of its tremendous possibilities in the truck field. This enthusiasm lead him to join the General Engineering Co. and was also responsible for the fact that within less than two months he was promoted from a subordinate position to that of director and vice president of the company, at the age of 33.

The Henley-Kimball Co., Boston, Mass., has been appointed New England agent for the Doble car.



Carburetor Suggestions

Carburetors should never be adjusted if the engine is giving satisfaction.

Always open the throttle just before the engine is stopped. Remember to drain the float chamber at least once a month. Be careful not to screw the needle valve against its seat too tightly.

Unless the carburetor is clean, it will not give satisfactory results.

Rich mixtures can only be attained with a well adjusted carburetor.

Excess gasoline causes loss of power.

Too rich a mixture is often worse than one too lean.

Obstruction in the fuel supply is often caused by water lock. Remove all lint and dirt from gasoline before it reaches the carburetor and you will avoid trouble.

High fuel level causes a leaky carburetor.

If the engine runs poorly don't always blame the carburetor, there may be other reasons.

Never leave the throttle wide open and the engine racing idle. Try to keep all carburetor joints tight.

Sediment often gathers in the float chamber, preventing a proper flow of gasoline.

First Hint of Smart Spring and Summer Coats.



In the motor coat of brown suede fabric at the left, one can see the tendency to combine durability with style. The coat was tailored by J. M. Gidding & Co., New York, and while an all-weather garment its lines make it distinctive for street wear.

At the right is an illustration of an ingenious way of treating fullness and at the same time maintain a straight line from shoulder to hem. This is a modish tan gaberdine coat, finished in silk stitching. Note the pleats gathered under the novel belt.



A striking combination of navy blue gaberdine and Scotch plaid taffeta has been contrived by Franklin Simon, New York, in the auto coat in the centre. Buttons of plaid taffeta serve as trimming.

A smart motor coat is shown at the left, it having been turned out by the Shelton Looms and dubbed the "Coat of Pinehurst." It is an exceedingly smart spring model, featuring huge pockets, a double belt and a stitched collar of broadcloth.

Another Shelton Looms product, the "Chiquita" model at the right, is a knee length coat that promises to become very popular this summer. Large white pearl buttons fasten the pockets, while the huge roll collar has a contrasting four-inch border.



Photographs by Joel Feder. N. Y.

"Sawdust" Alcohol for Motors

Forest Service Scientist Discusses Use of Fuel Made From Wood Waste

JUST about the time millions of motorists in the country began to have forebodings regarding their future gasoline supply, with visions of 50-cent gasoline, the gratifying announcement is made that an efficient substitute is to be found in a grain alcohol, made from sawdust. As sawdust is available in enormous quantities, the possibilities are bright.

Howard F. Weiss, director of the Forests Products Laboratory of the Federal Forest Service at Madison, Wis., in commenting upon the fact that the development of sawdust through the newest scientific methods into a true grain alcohol can be used for fuel, says he considers that the Canadians who are conducting this work are on the right track.

There will be over 3,000,000 motor cars in use in the United States by spring time and it requires about 1,500,000,000 gallons of gasoline to run them throughout the year. To produce an equal amount of alcohol would require operations on a gigantic scale, but the raw material is available, as there is an enormous supply of wood waste in the great valleys of the Willow, Nechako, Bulkley and Skeena rivers in central British Columbia.

This territory has been opened up by the new trans-continental Grand Trunk-Pacific railway. It was in this section that the distillation experiments were first made to determine the feasibility of producing alcohol from sawdust. The wood waste is broken down by distillation, and the wood alcohol produced and converted by a simple process into true grain alcohol.

The waste from the lumber industry alone will furnish the necessary raw material for producing millions of gallons of alcohol annually. In the vast territory of British Columbia hundreds of thousands of acres of land are being cleared of trees for the development of agriculture, while all over southern and middle Canada and the United States forests are being cut off, leaving enormous quantities of sawdust, chips and waste in other forms suitable for making alcohol. This waste at present is practically valueless and at times is even an expense to the lumber producers, as they have to devise means of getting rid of the surplus quantities.

Some camps use the sawdust and waste as fuel, but even for this purpose it is never worth more than 50 cents a ton and thousands of tons accumulate rapidly where lumbering operations are conducted on a big scale. It is estimated that it costs the lumber men 66 cents a cord of 1800 pounds to dispose of this waste, and the total annual loss aside from wood burned for motive power in saw mills is \$6,000,000.

The experiments conducted show that it is possible to obtain from 20 to 25 gallons of pure grain alcohol from a ton of dry sawdust. On this basis of production the total wood waste of the country would produce upwards of 500,000,000 gallons of alcohol annually, which is equal to nearly half the present annual consumption of gasoline.

Alcohol is being used in many cars at present in use by the military authorities in Europe. Its calorific power is little more than one-half that of gasoline, but its greater efficiency (alcohol 28 per cent., gasoline 16 per cent.) compensates for this. Its higher efficiency is due to the following reasons:

1—The volume of air required for complete combustion of alcohol is only about one-third that required by gasoline, and thus much less energy goes away in the exhaust. Moreover, this small dilution with air enables a more perfect mixture to be formed with consequent more perfect combustion.

2—The alcohol air mixture can be safely

subjected to pressures of 200 pounds to the square inch without spontaneous ignition, whereas the safety limit of gasoline is 80.

3—All mixtures of alcohol and air containing from four to 13.6 per cent. of alcohol are explosive, whereas the explosive range of gasoline is from two to five per cent., necessitating much more careful carburetor adjustment.

4—The combustion products of alcohol are smokeless, almost odorless and do not clog up the cylinders and valves.

Alcohol, however, is not a good fuel to start an engine on, as it is less volatile than gasoline.

GOOD MOTOR ROADS ON PANAMA ISTHMUS.

The total length of the connecting highways on the Isthmus of Panama is 121.3 miles, including 21 miles of city streets in Panama, 17.3 miles of road in the Sabanas district and 48 miles in the canal zone. The roads are all good in the sense of being easily traveled over by motor cars and the work of extension and improvement is being constantly prosecuted. The other sections included are 17 miles of roads in the area at the Atlantic end of the isthmus and 18 miles on the west side of the canal in the villages of Culebra, Empire and Las Cascaidas.

COMING EVENTS

CONVENTIONS, ETC.

National Assn. of Automobile Accessory Jobbers, Summer Meeting, at Homestead Hotel, Hot Springs, W. Va. June 4-6

AUTOMOBILE RACES.

Uniontown, Penn., Speedway.....May 10
Los Angeles, Cal., Speedway.....March 17
Los Angeles to Salt Lake City, Road.....March 25
Los Angeles, Cal., Speedway.....March 25
New York, Sheepshead Bay, Speedway, Metropolitan.....May 19
Walla Walla, Wash., Track.....May 30
Indianapolis, Ind., Championship, Speedway.....May 30
Chicago, Ill., Championship, Speedway.....June 9
Kansas City, Mo., Speedway.....June 16
Cincinnati, O., Speedway.....June 23
Omaha, Neb., Championship, Speedway.....July 4
Benton Harbor, Mich., Track.....July 4
Spokane, Wash., Track.....July 4
Tacoma, Wash., Speedway.....July 4
Des Moines, Ia., Championship, Speedway.....July 14
Missoula, Mont., Track.....July 15
Buffalo, N. Y., Intercity, Road.....July 17-19
Anaconda, Mont., Track.....July 22
Tacoma, Wash., Championship, Speedway.....July 28
Kansas City, Mo., Speedway.....Aug. 4
Cincinnati, O., Championship, Speedway.....Sept. 3
Pikes Peak, Col., Road Climb.....Sept. 8
Providence, R. I., Championship, Speedway.....Sept. 15
New York, Sheepshead Bay Speedway, Championship.....Sept. 29
Kansas City, Mo., Speedway.....Oct. 6
Chicago, Ill., Speedway.....Oct. 13
New York, Sheepshead Bay Speedway.....Oct. 27

AUTOMOBILE SHOWS.

Zanesville, O., Muskingum Motor Club.....March 10-17
Fort Worth, Tex., Auto Dealers' Assn.March 12-14
Vancouver, B. C., British Columbia Automobile Assn., at Horse Show building.....March 13-16
Fargo, N. D., North Dakota and Minnesota Auto Dealers' Assn.March 13-16
Denver, Col., Automobile Dealers' Assn.March 13-17
Davenport, Ia., Tri-City Auto Trade Assn., at Coliseum.....March 14-17
Mason City, Ia., Automobile Dealers' Assn. at State Armory.....March 14-17
Kenosha, Wis., at Coliseum.....March 14-17
Columbia, S. C., Columbia Automobile Dealers' Assn.....March 14-17
Mantlwoe, Wis.....March 17-21
Pittsburg, Penn., Auto Dealers Assn. of Pittsburg, at Motor Square Garden.....March 17-24
New Haven, Conn., New Haven Auto Dealers' Assn., Hotel Taft.....March 19-24
Cedar Rapids, Ia., Automobile Trades Assn.....March 19-24
Paterson, N. J.....March 19-24
Trenton, N. J., Trenton Auto Trade Assn., at 2d Reg. Armory.....March 21-24
Mankato, Minn., Mankato Retail Auto Dealers' Assn.....March 22-24
Clinton, Ia., Clinton Auto Dealers' Assn.March 27-31
Deadwood, S. D., Management of J. E. Nelson.....March 27-31
Calumet, Mich., Frank Ketchell, Mgr., at Coliseum.....April ..
Stockton, Cal., San Joaquin Auto Trades Assn.....April 4-7
Spokane, Wash., Interstate Fair.....Sept. 2-9
Milwaukee, Wis., at State Fair Park.....Sept. 9-15

Nine Years' Study of Steam Motor Vehicles

Investigations Made to Determine Possibility of Overcoming Certain Serious Disadvantages Under Which the Steam Motor Vehicle Formerly Labored, as Discussed Before the S. A. E. Recently

By **Abner Doble**

(Vice President, the General Engineering Co.)

THE purpose of this paper is to present a summary of investigations covering a period of nine years. These were made to determine the possibility of overcoming certain serious objections and disadvantages under which the steam motor vehicle formerly labored.

Ten years ago steam cars were in their zenith—not that a large number of makers were producing them, nor yet that the majority of cars were steamers, but rather that a most progressive and prosperous organization was producing these cars on a real quantity basis. The White steamer of that day was universally respected or beloved, accordingly as the person affected was a gas car man or a steamer advocate.

The Stanley steam car has been manufactured since 1898 without cessation. The evolution of this car has been gradual and conservative, and it has enjoyed a well merited reputation for service at low cost. A fire tube boiler and locomotive type engine have been used from the first. Stanley Bros. have added improvements only when there was a well recognized demand. They have thus accumulated those necessities of modern motor cars, such as electric lights, stream line bodies and one-man top. A condenser was adapted to the car in 1914, and as a result about 200 miles can be covered on one filling of the boiler. Kerosene is now burnt in the main burner (with gasoline for starting and for the pilot), and the mileage per gallon is high. The fusible plug has been abandoned in favor of a thermostat for shutting off the fuel in case the supply of water runs short.

A large number of more or less ineffective attempts have been made to produce a satisfactory steam car by persons ill informed on the actual requirements and apparently lacking in the necessary understanding of automobile production conditions.

Immediately after the early day popularity of the steam car internal combustion engine began to be favored by engineers. With the introduction of the long stroke, high speed engine in Europe the steam car fell behind rapidly in the march of progress. I do not wish to convey the impression that motor vehicle builders erred in selecting the gasoline

engine. The market demanded cars and more cars, and the makers chose the only practical power plant available. No one wanted a vehicle that emptied a horse trough every 20 miles. Very few drivers were equal to the task of properly feeding the boiler. The idea of spending all the way from a quarter of an hour to an hour and a half in starting soon lost its relish.

Low Mileage a Disadvantage.

ONE great disadvantage of the steam car was the insufficient mileage that was obtained from the water that could be conveniently carried. Several steam cars were equipped with an apparatus intended to condense the steam, but a continuous run of 100 miles without refilling was uncommon. Owing to the use of heavy cylinder oil these condensers, as well as the water tank, required periodical cleaning. Steam cars not so equipped would run approximately 30 to 35 miles on a tank full, about 35 to 40 gallons.

Apparently no one had considered using a honeycomb radiator. The reasons advanced against it were that the thick oil was liable to clog the extremely small passages, and that the exhaust steam (particularly in cars with flash

honeycomb radiator on a car and operate it with a fire tube boiler. This we succeeded in doing late in 1913, and obtained several startling results. The car would run anywhere from 1000 to 1500 miles on one tank (24 gallons) of water. The boiler operation was entirely unaffected by the oil pumped into it from the engine cylinder. Having shown that it was possible to travel an adequate distance on one supply of water, we turned to the study of the steam generator, with special regard to its operation when fed with water containing oil, graphite, and in winter alcohol.

The so-called flash boiler, consisting of a series of coils forming, in effect, one continuous tube, was naturally out of the question. Its entire absence of steaming stability was a source of constant aggravation to a driver in a hilly country. However, it had the immense advantage that the direction of the water flow was opposite to the flow of the gases of combustion, which allowed the water to take the last possible heat unit from the flue gases. Its all-steel construction with consequent immunity from leaks due to low water was also a great advantage.

The vertical fire tube boiler was also out of the question for production on account of its great weight, potential danger present with a large diameter shell, its high cost because of the apparent necessity of winding the shell with a mile of piano wire and its liability to leaks both from oil working through the expanded joints where the tubes were fastened into the heads and from overheating with low water. Notwithstanding these formidable disadvantages, when in good condition it was the best boiler from the driver's standpoint, owing to its large reserve of water heated to the steam temperature, which admitted of great acceleration. It was also efficient because of the surface heating arrangement with extremely short distance through which the gases radiated heat to the tubes.

The water tube boiler, which has been built in almost every conceivable shape for motor vehicle service, seemed to offer a basis on which the good characteristics of the flash and water level types of boilers might be combined. This at

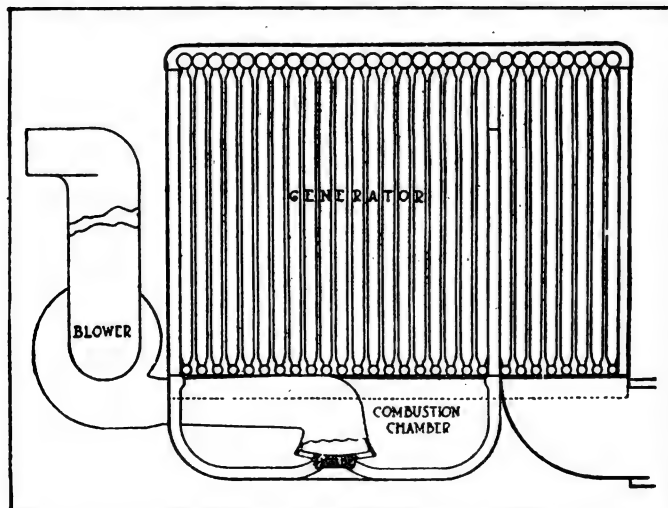


Fig. 1—New Type of Steam Generator.

boilers) was liable to melt the solder. It was also believed that oil would injure the boiler, cause violent foaming and that the successful lubrication of a steam engine required a heavy molasses like oil. It was particularly hard to reconcile these beliefs, and we determined that the best thing to do was to put a

first seemed a forlorn hope, as the apparently conflicting conditions seemed unreconcilable.

Deposits of scale occur in every type of boiler, with a resultant drop in efficiency and added liability of burning the already extremely hot heating surface. In the water level types this scale would settle in the non-circulating portions of the boiler, such as the water column and blow-off connections.

Steam Generator Requirements.

IN STUDYING these apparent conflicts we could see that all functions were closely related. That is, a water level boiler held the temperature of the steam practically constant, with no possibility of temperatures high enough to effect a deleterious change in the lubricating oil. This allowed the same oil to be used over and over. It also allowed the use of a soldered radiator to condense the exhaust steam. The honeycomb radiator condenses such a large portion of the exhaust steam that little make up water is required, with the result that much less scale is introduced into the system. Since little water is lost, in winter alcohol can readily be used in large enough proportions to prevent freezing. The use of a mixture of alcohol and water results in an imperceptible drop in power because of the large amount of heat carrying medium that must be circulated.

The use of regular gasoline engine cylinder oil for the lubrication of those parts in contact with the steam, would make a steam generating and condensing system of this kind practical. Such oil is more agreeable to handle and easier to procure than the heavy oil used in steam engines. It rapidly forms an emulsion with the water, owing to the violent agitation and intimate contact. It cannot form clots and clog up the radiator passages, and since the return from the radiator is introduced into the bottom of the water tank the agitation of the contents of the tank is sufficient to maintain the emulsion. This insures that the oil is regularly pumped into the boiler along with the water. The oil that thus finds its way into the boiler performs several valuable functions: First, it coats thoroughly every portion of the interior of the boiler with an exceedingly thin film of oil. While this is thin at ordinary temperatures, it is much thinner at 485 degrees Fahrenheit, which is the approximate temperature of the boiler at 600 pounds pressure.

Scale will not stick to a surface coated with oil, so that the interior of the boiler is absolutely protected from scale, as well as from rust. Very little scale bearing water is introduced into the system because of the efficient condenser, but in several years operation enough scale would be formed to render a boiler useless, even though none of it adhered to the tubes. The second function of the oil in the water is to combat this condition, which it does with thoroughness and dispatch. As soon as a particle of scale is thrown out of solution it is thoroughly coated with oil, which renders it incapable of sticking to any other

particle. This scale therefore remains in suspension, and owing to the violent ebullition and constant flow toward the steam outlet is carried along and out with the steam, finally reaching the water tank. This action appears to be exceedingly thorough, and in several years use no accumulation of scale can be detected in any portion of the boiler. It appears that the scale problem can be solved when such particles of foreign matter are kept small enough so that they will be readily carried over with the steam.

The steam generator, Fig. 1, which has been worked out to fulfill these inter-related conditions, is a flash generator in theory, yet has the appearance of a water tube boiler and has a water level in the evaporating zone. The close and regular heating surfaces give heat transfer conditions resembling those of a fire tube boiler, and yet the progressive water flow, counter to the flow of the gases, with no circulatory flow, is characteristic of the flash type. The water enters the bottom of an economizer zone and flows to the top under the action of the pumps and gravity; the hottest water collects at the top. From there the water overflows through a connecting pipe into an evaporating zone, where it is converted into steam. The water level is maintained about half way up the generator by an automatic by-pass valve; this is so arranged that when the regulator tube is filled with steam the by-pass valve is closed by the expansion of the tube, forcing the water from the pumps to lift the check valve. The water can then enter the generator. As the water level rises the regulator tube is filled with water from an exposed pipe leading from the water manifold. This water is not in circulation in the generator, and therefore remains quite cool. The regulator tube then contracts and opens the by-pass valve, allowing the water to return to the tank.

The generator tubes are vertical, swaged at the ends to half their diameter, and welded into horizontal headers, top and bottom. Each section thus formed is connected to manifolds, top and bottom, for the exit of steam and the entrance of water. This construction is absolutely without danger of explosion and is also cheap to manufacture. Any damaged section can be replaced, or isolated pending replacement, in a few minutes. The casing of this generator consists of a 1/2-inch asbestos board, 1/4 inch of mineral wool and a planished iron jacket.

Starting Steam Cars.

PERHAPS the greatest disadvantage in operating steam cars was that known as "firing up," or getting the burner started to raise steam. Steam cars almost without exception have used a Bunsen burner of the vaporizing type, which required preheating to vaporize the fuel. This was necessary to insure that enough mixture passed into the combustion space to ignite readily and to continue burning. After combustion was well under way the fire kept the vaporizer heated. When standing a supplementary burner was lighted to main-

tain the vaporizer heat; this ignited the main burner when the car was to be used again.

About three years ago we first tried to eliminate the time and labor required to start combustion. It was suggested that a carburetor and spark plug be used—a blower driven by an electric motor to furnish the requisite air, the idea being to use these with a regular Bunsen burner. This was found to work fairly well with gasoline, except that undesirable precipitation of the fuel took place. It also seemed necessary to provide means by which kerosene could be used for starting, without recourse to gasoline.

We finally discovered that kerosene could be ignited by an electric spark with absolute certainty and regularity, if these conditions are observed: First, the kerosene must be separated mechanically so that the individual particles are sufficiently small to insure a rise in temperature past the point of ignition during the time in which they absorb heat from the spark; second, the spark must occur near the atomizing nozzle, at which point the fog is so dense that one group of kerosene particles igniting invariably ignites the rest. Third, the velocity must be so low that the particles can absorb sufficient heat from the spark to exceed the ignition temperature. Fourth, the mixture must be much richer at the point where ignition is to occur than is that for most efficient combustion. The combustion should occur in a refractory chamber so arranged that it attains an extremely high temperature; complete combustion of a large amount of fuel can then be obtained in a small space.

Thus in a complete apparatus we have an electric motor, direct connected to a multivane blower, and a graduated kerosene pump. The kerosene pump draws a measured quantity of fuel from the supply tank and forces it through the atomizing nozzle; the resultant fog is ignited by a spark plug. A measured amount of air is forced in by the multivane blower, which whirls the rich ignited mixture down through an inlet tube against the bottom of the refractory combustion chamber, where the fuel is consumed. To stop the combustion it is only necessary to break the blower motor circuit. This is done automatically by a regulator set to operate at a predetermined steam pressure.

With the old-fashioned Bunsen burner, which has been used on all previous steam cars, it is necessary first to heat the vaporizer. This is done with a drip cup or a painter's blow torch, although on modern steam cars acetylene gas is used. The fuel valve is then opened slightly, allowing very little fuel to flow until the burner has become well heated, after which the fuel valve can be left open. The starting of the fire takes about six minutes and requires the care of the operator until it is going well. After the fire is started, steam is made quickly. On some types of boilers enough pressure can be raised to start the car in about a minute and a half after the fire is under way. It is therefore apparent that if practically the entire time formerly used in starting the fire can be

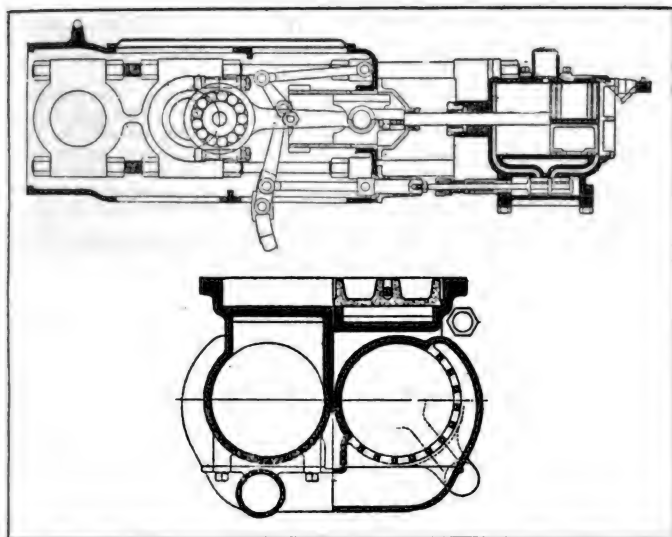


Fig. 2—Single Expansion Uniflow Engine.

saved it is a reasonably simple matter to build a power plant that can be started in a short time, with no labor or attention required.

The engine of a steam vehicle should last for many years of hard service. It has proved to be a relatively simple matter to provide ample dimensions of the working parts so that the mechanism is safe for continued operation under maximum conditions of load. In order to have efficient working it is necessary to provide for high expansion. This can be obtained with a compound engine, but not satisfactorily, as the ratio of cylinder volumes has to be carefully determined in relation to the probable loads, speeds and steam chest pressures. These conditions vary so widely that the single expansion engine, Fig. 2, is necessary.

To provide the high expansion desirable, with a simple noiseless valve gear and one valve per cylinder, it is imperative to use the uniflow principle. In the uniflow engine the valve takes care of the steam inlet only, the exhaust passing out through ports at the end of the stroke when these are uncovered by the piston. It is thus possible to secure cut-off at five per cent. of the stroke. Since the thermal conditions in the uniflow cylinder are practically ideal, it is unnecessary to use superheated steam. This means that little cylinder lubrication is required, and the troubles formerly caused by superheated steam are absent.

The engine directly geared to the axle, with a 47 to 48 ratio, can produce enough torque to slip the driving wheels on dry ground. The slow engine speed thus possible makes elaborate lubrication systems superfluous. The general arrangement of the principle parts of a steam car is shown in Fig. 3.

Advantages of a Perfected Steam Power Plant.

FIRST. Torque range of 100 per cent. with a maximum torque available at zero speed; change gear mechanisms and clutch therefore unnecessary. Mean effective pressure (and equivalent draw-bar pull) always under control of the operator; variable by throttle from zero to maximum, a maximum limited only by

the resistance between the driving wheels and road.

Second. Utmost mechanical simplicity, with not over 25 moving parts in the entire car, and only 15 in the engine.

Third. Smooth and quiet operation, owing to low engine speed and to location of engine on axle.

Fourth. Low running cost; kerosene or crude oil used for fuel.

Fifth. Low manufacturing cost owing to simplicity of construction and lack of

fussy work in production.

Sixth. Entire absence of lubrication troubles; no contamination of crank case oil by kerosene, gasoline, water, road dust and carbon.

Discussion of Steam Motor Vehicles

P. G. Thomas:—This paper recalls a conversation with Mr. Doble, in which he contended that multicylinder engines are unnecessary when if steam is used a two-cylinder engine is sufficient. We then rode in his car at speeds varying from one to 60 miles per hour. It was a most pleasing sensation. There was absolutely no noise. The car attained any speed desired at any time.

Mr. Utich:—What does the seven-passenger car weigh?

Abner Doble:—A seven-passenger car of 128-inch wheelbase, 56-inch tread front, 57-inch tread rear, equipped with a rather heavy body and 32 by five-inch wheels, weighs 3100 pounds, with tank filled ready for the road.

Arthur J. Scalf:—What is the greatest horsepower obtainable with this type of power plant?

Abner Doble:—The highest normal horsepower that we have used so far is 25, but a 25 horsepower steam power plant at the standard pressure of 600 pounds per square inch will exert about 132 horsepower for about eight minutes.

S. L. Blackburn:—What is the maximum pressure capacity of the boiler?

Abner Doble:—The boiler is designed for a working pressure of 600 pounds. The safety valve is set for 1000 pounds. The boilers are all tested to 5000 pounds. They will rupture at about 8500 to 9000 pounds. At this pressure the tubing ruptures at a place remote from the welds. My own car has been in service since December

1913. The safety valve has never blown. This means that the maximum pressure has never reached 1000 pounds.

Thermal Efficiency.

Walter C. Baker:—Why is an efficiency twice that of a gasoline car claimed?

Abner Doble:—Everything depends upon what you mean by "efficiency." We know that 18 per cent. thermal efficiency is obtainable from a gasoline engine running at full load. We also know that cars do not run at full rated load much more than one per cent. of the time. When running at 20 or 25 miles per hour about five horsepower is required to drive the car. Under such light load the ordinary engine will have a thermal efficiency of about 4.5 to five per cent. The highest thermal efficiency we know of today with the steam power plant is about 21.8 per cent. at its full rated load. This is obtained by using a combustion system in which the air is preheated, at the risk of burning out the grate bars. The Doble steam generator has no grate bars, but uses a refractory material that we developed. It will stand about 3400 degrees Fahrenheit before it fuses. The temperature attained in our fire box is about 2600 degrees Fahrenheit. The air is preheated to 200 degrees before it enters the carburetor, by utilizing about one-third the heat that would otherwise go out of the stack. The boiler efficiency without the economizer is about 82 per cent. This is equivalent to standard practise in boilers. With our boiler we can increase the efficiency about four per cent. by the economizer and by using a regenerator, which can be placed on the end of the stack, we can raise the boiler efficiency to about 92 per cent. The best net thermal efficiency that we have been able to secure from our power plant is about 16 per cent. under full load. With the five horsepower load imposed when a car is driven at 25 miles per hour, we realize 14 per cent. net thermal efficiency. My car, which was built three years ago and is crude in some ways, has been driven almost 40,000 miles. It will run 15 miles to the gallon of kerosene under favorable conditions and will average about 11.5 miles per gallon, although I drive through traffic and mud a part of the time. The old type of steam car never ran more than seven miles per gallon.

H. H. Newsom:—What piston speed is used in the engine?

Abner Doble:—We have found that the most efficient piston speed is 375 feet per minute, which corresponds to a car speed of about 37 miles per hour. I have driven my car 80 miles per hour. The corresponding piston speed is 800 feet per minute, not counting the slip, which would be about 12 per cent. at that point, making a maximum piston speed of about 900 feet per minute. I have never run an engine at any higher speed than that in a car.

H. H. Newsom:—What is the temperature of the steam?

Abner Doble:—The theoretical temperature of saturated steam corresponding to a pressure of 600 pounds is 490 degrees Fahrenheit, but we find sometimes that on ordinary loads there will be 100 degrees superheat in excess of that. Under full loads it will be down to 490 degrees Fahrenheit owing to the fact that we will

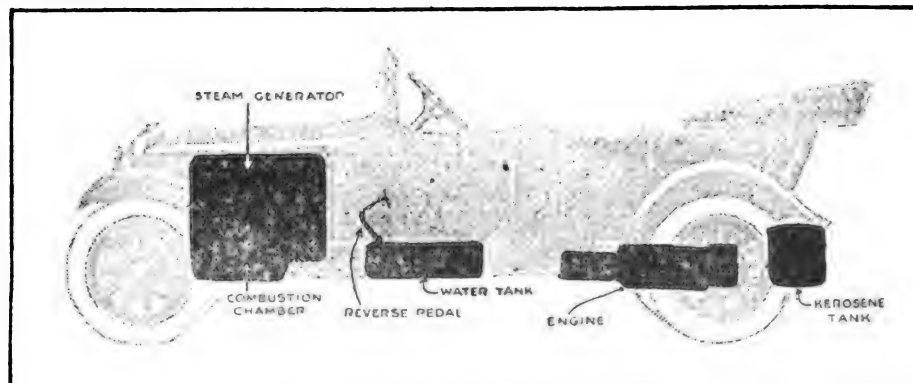


Fig. 3—Steam Car Showing Location of Principal Parts.

then probably have a three to five per cent. of moisture in the steam.

Type of Combustion System.

Mr. Waite:—What sort of a combustion system is used?

Abner Doble:—An efficient blower furnishes the requisite amount of air, and mixes with it enough kerosene to make a very rich vapor. The kerosene is atomized and the vapor ignited by an electric spark before the air required for complete combustion is added. The spark plug is connected in parallel with the blower motor circuit. The ignited mixture flows through the inlet tube and into the combustion chamber, where it burns completely before the hot products of combustion pass through the boiler.

Mr. Schwartzberg:—What about the fire hazard?

Abner Doble:—It is negligible with kerosene as fuel.

Walter C. Baker:—Is the exhaust clean when using kerosene?

Abner Doble:—Yes. All carbon is consumed at 1800 degrees Fahrenheit. The combustion chamber temperature under normal working conditions is about 2450 degrees. The feed is set so that the fuel is entirely consumed. The exhaust will smoke sometimes in starting until a temperature of 1800 degrees Fahrenheit is reached in the combustion chamber.

Mr. Schwartzberg:—Is the heat objectionable when driving in summer weather?

Abner Doble:—The generator is insulated with a special material that does not reach a temperature of much over 150 degrees Fahrenheit. We use a dashboard that comes down to the frame and then the frame is covered with a floor. A space of two inches is allowed between that floor and the floor boards proper. We use a one-inch cocoa mat on top of the floor boards. The result is a much cooler car than one of the regular gasoline type.

Arthur J. Scaife:—How flexible is the power plant? If the throttle is opened or closed suddenly what is the variation in pressure?

Abner Doble:—If the throttle valve is suddenly opened wide with the car at a standstill, the pressure will drop from 600 to 450 pounds by the time the car reaches a speed of 60 miles per hour.

Walter C. Baker:—How many seconds does it take to start?

Abner Doble:—Five and one-half seconds from a standstill to 30 miles per hour.

E. L. Clark:—Fig. 3 shows the engine built right onto the back axle. What is the unsprung weight?

Abner Doble:—The unsprung weight added to the axle on the older car was 100 pounds. The new engine will add about 10 pounds more, but we have saved about 15 pounds in the differential, as we use no differential cage. The piston, piston rod and cross head weigh about eight pounds on each side of the engine. The latter runs at 600 revolutions per minute when the car is travelling 60 miles per hour.

Over 200 steam driven omnibuses have been running for a long time in England. Last year they changed the fuel from kerosene to coke. The latter is fed by automatic stokers driven from the engine. The grate rocks so many times a mile, and all the driver has to do is shove in a little more coke every 10 miles or so. Coke sufficient for about 50 miles is carried. They also use coke burning steam lorries.

A. M. Dean:—What is the temperature of the engine when running at 25 or 30 miles per hour?

Abner Doble:—The steam temperature at the intake when running at 25 miles per hour is just about 390 degrees Fahrenheit. The temperature at the exhaust, in every case, is 212 degrees Fahrenheit, or within two or three degrees of that, because at the exhaust the steam contains about 15 per cent. water.

S. L. Blackburn:—What is the piston displacement of the engine?

Abner Doble:—It is 314 cubic inches per revolution.

Mr. Dunkin:—What is the bore and stroke of the engine?

Abner Doble:—It has a five-inch bore and four-inch stroke.

Reversing Engine.

E. L. Clark:—How is the engine reversed?

Abner Doble:—The "Joy" valve gear used was invented a long time ago by David Joy in England. It is the same gear that the White company used on its engines. The engine is reversed simply by changing the timing of the valve; that is accomplished by tipping the rock shaft to an inclination opposite to that used in running forward.

H. H. Newsome:—Does the Joy valve gear have a link motion?

Abner Doble:—No, it does not. It is called a radial valve gear, and is driven from the connecting rod, as shown in Fig. 2. The end of the anchor link is nearly horizontal. The valve link is attached to what we call the "correcting" link, because without it the valve would not have a correct motion.

H. H. Newsome:—Is the control manually operated?

Abner Doble:—The control is by a pedal.

H. H. Newsome:—Is it advanced as the speed increases?

Abner Doble:—No; to start the car the pedal is moved to the first notch. That gives cut-off at three-quarter stroke. At higher speed, fuel can be saved by moving the pedal to the next notch.

W. D. Appel:—What is the maximum cut-off when the valve gear is in the extreme position?

Abner Doble:—The maximum cut-off is $2\frac{1}{4}$ inches on a four-in. stroke. There are two other positions; the first for ordinary running and for extreme acceleration is one-quarter stroke, and the second for economical running, or for extremely high speed after acceleration has cut off at one-eighth stroke.

W. D. Appel:—With the cut-off set at one-eighth stroke, would it be possible for the engine to stop on dead centre so that it could not be readily started?

Abner Doble:—Unless the cut-off is later than mid-stroke this can occur. In order to start under this condition it is necessary to use the reverse pedal first.

Production Costs.

Mr. Schwartzberg:—With a properly equipped plant, turning out 300 cars a day, and with metal at normal prices, what would be the cost of manufacture as compared to a \$2000 gas car?

Abner Doble:—A car to give the same power performance as a Cadillac, for example, and with the same finish and quality of workmanship, will cost \$198 less per car. In general the saving will amount to eight or 10 per cent. of the list price of the car.

S. L. Blackburn:—Can the car be built in any class? Say for example in the \$700 class?

Abner Doble:—Yes. But the performance will be better and less care is necessary in finishing and fitting pistons and cylinders.

C. E. Willson:—Are the braking possibilities the same as in gasoline cars?

Abner Doble:—Yes, by using the reverse pedal it is possible to stop almost instantly. Beside this two sets of brakes are provided as required by law. The centre of gravity of the car is low and nearer the rear than in gasoline cars, hence the car holds the road better and the wheels do not slide so much as they would otherwise. This makes the braking action more effective.

Arthur J. Scaife:—How is the engine lubricated?

Abner Doble:—By the time the steam enters the cylinders, it contains about three per cent. moisture, which increases to about eight per cent. as the expansion takes place. This moisture does the lubricating. Little internal lubrication is required, for the piston speed is low at ordinary driving speeds. The cylinder surface is cast iron, which is easy to lubricate. We use oil to prevent corrosion and to help lubrication. The last gallon of oil I used in my car was sufficient for 12,200 miles operation. The oil used is

primarily to clean the scale from the boiler.

George W. Smith:—What is the weight of the power plant?

Abner Doble:—The new engine will weigh about 240 pounds. The old engine weighed 220 pounds. The generator will weigh about 520 pounds; the water tank about 250 pounds. The radiator will weigh 15 pounds more than a gasoline car radiator. The engine will develop 70 horsepower continuously.

H. H. Newsome:—Locomotives have traveled 50,000 miles without any oil in the cylinder. Cast iron will get along with little or no lubrication.

E. L. Clark:—Is there any possibility of knocking off the cylinder head because of water in the cylinder when starting?

Abner Doble:—We use ordinary slide valves, placed under the cylinders. Water that condenses in the cylinder drains into the steam chest, because the valves fall away from their seats. The car can stand for days and the throttle then be opened suddenly without injuring the engine.

Mr. Sherbondy:—How is the water from the condenser handled? Do you carry it back to the main supply tank and then into the boiler?

Abner Doble:—The water from the condenser goes through a pipe into the bottom of the water tank. From there it is forced into the boiler by the boiler feed pump.

MAIN THOROUGHFARES FOR PENNSYLVANIA.

A proposition to have two main line thoroughfares constructed in Northern Pennsylvania, one to be known as the Susquehanna Trail and the other as the Sullivan Trail, will be presented to the Pennsylvania legislature in the near future. The plan is the result of the activities of the Wilkes-Barre Automobile Club, Wilkes-Barre Chamber of Commerce and the Wilkes-Barre Rotary Club, in co-operation with automobile organizations through northwestern Pennsylvania.

The Susquehanna Trail is laid out along the river from Harrisburg to the New York State line, connecting with the New York State highway system and giving Wilkes-Barre a direct connection with the William Penn Highway and the Lincoln Highway into Washington. On the north it will connect with Tunkhannock, Towanda and Sayre, leading onto the New York State highways to Montreal and Quebec over the Quebec-Miami Trail and with the Portland to Portland transcontinental route.

A Sullivan Trail Association has been formed in Towanda with C. H. Jennings as president and J. Roy Lilly secretary. Circulars are being sent out by this organization urging the various associations to support the petition to have the trail constructed.

The Sullivan Trail is proposed as a memorial to the famous Revolutionary hero of that name and will have its start at Easton and will connect with the New Jersey road system and lead over the Poconos to connect with the Susquehanna Trail at Wilkes-Barre.

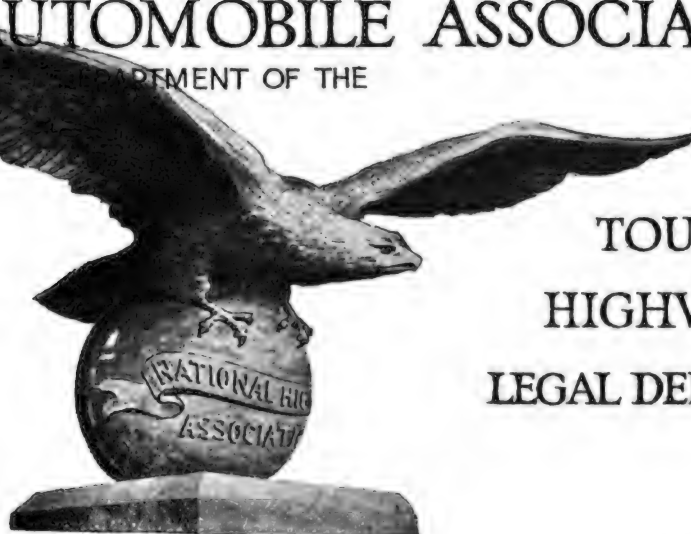
Gerald Fitzgerald, formerly with the Remy Electric Company and the Stewart Motor Company, has been appointed a travelling representative of the Nordyke & Marmon Co., Indianapolis, Ind.

OFFICIAL JOURNAL OF THE NATIONAL AUTOMOBILE ASSOCIATION

DEPARTMENT OF THE

NATIONAL
HIGHWAYS
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TOURING
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LEGAL DEPTS.



9 PARK STREET, BOSTON, MASSACHUSETTS

IN THIS issue we call your particular attention to a number of phases of law which are often heard and little understood. Some of these legal jottings it may not be amiss for you to remember.

NEGLIGENCE.

Negligence consists in conduct which common experience or the special knowledge of the actor shows to be so likely to produce the result complained of, under the circumstances known to the actor, that he is held answerable for that result, although it was not certain, intended or foreseen. He is held to assume the risk on the same ground.

DUE CARE.

The prudence which a person is to exert in order to be acting with due care is one which is necessary for his own protection, and it must be of precisely that degree which is commensurate with the danger to which he is exposed; that is, he must act as the ordinarily prudent man would act under all the circumstances.

RECKLESS DRIVING.

"Reckless," "recklessly" and "recklessness" are synonymous with "heedlessness" and "indifference," which is inattentive to duty; rashly negligent and more—driving with a wanton disregard of the rights of others.

ACCIDENT.

The word "accident" in its legal sense is defined to be (first) an event happening without the concurrence of the will of the person by whose agency it was caused; and (second) an event that takes place without one's foresight or expectation.

RESPONDEAT SUPERIOR.

"Respondeat Superior" is a phrase often used to indicate the responsibility of a principal for the acts of his servant or agent. In general it includes both the expressions "Master and Servant" and "Principal and Agent."

The doctrine of "Respondeat Superior" is that the master is not liable for injuries occasioned to a third person by the negligence of his servant while the latter is engaged in some act beyond the scope of his employment, for his own or the purposes of another, although he may be using the instrumentalities furnished by the master with which to perform his duties as servant. The expression "in the course of his employment" means, in contemplation of law, "while engaged in the service of the master" and nothing more. It is not synonymous with "during the period covered by his employment."

CONTRIBUTORY NEGLIGENCE.

Contributory negligence is the result of inattention and oversight, and involves the notion of some fault or breach of duty on the part of a person

to use such care for his safety as ordinarily prudent persons in similar circumstances would use.

In a recent case in Maine where the driver of an automobile was injured by coming into collision with a street car at a grade crossing, the Supreme Court held that the driver was contributorily negligent when he attempted to cross directly in front of the street car and (finding that the automobile almost stopped) in order to increase his speed and get by, gave the engine too much gas, thereby choking it and almost compelling it to stop.

MASTER'S RESPONSIBILITY.

A chauffeur to whom the owner of an automobile loaned his machine to make a visit, with instructions to return to a hotel to take the owner home later in the evening, ceases to be a licensee and resumes the relation of servant to the owner when the visit is accomplished and he starts on the return drive to the hotel.

MUST GIVE SIGNAL.

An automobile driver approaching a crossing where his view is obstructed must give warning and drive not more than eight miles an hour or he is so contributorily negligent that he cannot recover for injuries in a collision then ensuing.

MOTORISTS MUST NOT BE EXEMPTED.

Here is one interesting if not judicially tempered opinion of a judge of the Tennessee Supreme Court relative to motor vehicle owners.

Shannon's Code of Tennessee specifically excludes certain vehicles and animals of being exempt from execution.

A practising physician of Tennessee owned none of the property mentioned in the code, but he did own a two-seated runabout, answering all his needs as a means of conveyance to his patients and as a convenient method of bringing home

Tips for Tire Users

GET the right size and type of tires for your car and use them exclusively.

Apply tires with great care and be sure that they fit the rims.

Use inner tubes with proper type of valve.

Carry spare tubes in bags so as to prevent abrasion.

Don't overinflate or overload tires. There is a limit to what they will stand.

Keep your car wheels true and avoid driving in street car tracks or scraping curbstones.

Don't lock the wheels of your car in stopping—stop gradually; and don't skid or use too tight chains.

Don't expose tires to the light or allow an unused car to stand on tires all winter or for long periods.

Don't neglect tire cuts, or let grease, oil or gasoline soak into your tires.

his groceries and provisions.

In an attempt to save his automobile the physician undertook to take advantage of the code, but of no avail, in view of the following opinion of the learned judge:

"The automobile is the product of a civilization advanced much beyond the date of our exemption legislation; and it is as a means of transportation, a different class of vehicles altogether from those named in this statute. It was invented to meet the needs of a different class of citizenship from that intended to be protected by the exemption statute. It is a vehicle whose owner is usually well able to pay his debts and whether willing to or not so to do, should be thereto compelled."

PHYSICAL INCAPACITY.

The failure of an applicant for a license to operate motor vehicles to disclose any physical incapacity or infirmity to the licensing authorities, says the Massachusetts Supreme Court, does not of itself render the license void, nor does it make the person a trespasser in operating his automobile upon the highways. And while the failure of an applicant to make such a disclosure might be sufficient ground for revoking his license, still, having been regularly issued, it is valid until revoked by authority.

NO LOCAL ORDINANCES.

The city of Norwalk, Conn., enacted an ordinance requiring licenses for all motor vehicles and their drivers carrying passengers for hire, and a citizen was convicted of violating this ordinance. He took an appeal to the Criminal Court of Common Pleas, in which a demurrer of his was sustained, and the state appealed to the Supreme Court of Errors of Connecticut.

This court has recently decided that this ordinance is a regulation of the use of motor vehicles, and is contrary to the motor vehicle act of 1915, which prohibits cities, towns and boroughs, or any board or officers thereof, from making regulations affecting motor vehicles.

COLLISIONS AND HOW THEY HAPPEN.

The Court of Errors and Appeals of New Jersey recently quoted with approval the statement made by Mr. Thompson in his valuable work on "Negligence," to the effect that cases of collision on highways almost invariably involve questions of concurrent negligence on the part of both actors; and that as the circumstances attending such injuries are within the range of every day observation and experience, the sense of contributory negligence in those cases, is in a peculiar sense a question for a jury, though, of course, within the limits of the principle that there must be evidence tending to the conclusion and subject also to the rule that in cases where the evidence tends only to that conclusion the judge can decide it as a matter of law.

CARE REQUIRED OF A CHILD.

A little girl of six years was at noon time crossing the street when she was struck by an automobile, knocked down, was injured and awarded \$600 damages.

After declaring that the verdict was not excessive the Supreme Judicial Court of Maine said: The test as to whether a girl of six years of age exercised reasonable care in crossing a street used by automobiles depended upon whether she used that degree of care which an ordinarily prudent child of her age and intelligence are want to use under like circumstances.

IMPUTATION OF NEGLIGENCE.

In a recent case in Vermont in which the question of imputing the negligence of an operator of an automobile to a passenger for hire was under consideration, the Supreme Court said:

In such an action as this evidence that the deceased was a passenger for hire was admissible, notwithstanding the possibility of the claim that the deceased took some action inconsistent with his position as a mere passenger, or that he was guilty of contributory negligence; since the proposition that he was a passenger for hire fairly implies that he was not in control of the car and was not engaged in a joint enterprise which includ-

Battery Needs

FIRST—Add distilled water (not less often than once in two weeks), sufficient to keep level of electrolyte one-half inch above plates.

Second—Never use battery which is in a leaky condition. Have it repaired.

Third—Keep battery fully charged. If gravity of electrolyte is below 1.275 on two successive test dates, have battery charged.

Fourth—Never allow battery to become overheated.

ed the driver and was not himself contributorily negligent.

It is not the rule in Vermont that a passenger in a vehicle, whether public or private, is so identified with the driver, by virtue of this association, that the driver's negligence is imputable to the passenger.

PERSONS ENGAGED IN COMMON ENTERPRISES.

The general principle of law of persons engaged in a common enterprise is that all persons so engaged are liable for an accident in the carrying out of that enterprise, and the contributory negligence of one in such a case is to be imputed to the other or others engaged in it. It follows, therefore, that where one of those is engaged in the enterprise he cannot recover from another of them, if the one was injured through the negligence of the other.

CARELESSNESS IN USING ONE'S FACULTIES.

The driver of a large moving van, whose view was unobstructed and who might have seen a street car some 700 feet away, was injured by the car running into the van, and the court held that he was guilty of contributory negligence and could not recover because he

could not see the headlight of the car, which was burning until it was but 10 or 15 feet away.

Where a man of 63 years, inexperienced in handling automobiles, was driving on the left side of the road and saw a woman approaching in her team, but continued directly towards the horse, so close that it was naturally frightened and whirled quickly to the left, overturning the woman's wagon and throwing her to the ground, the Supreme Court of Maine held that such an operator of a car was guilty of negligence.

The court in this case also held that a woman driving at a walk along the right side of the road with loose reins, being the usual manner of handling the particular horse, with which she was familiar, it being 10 years old, generally, and not ordinarily being afraid of automobiles, the horse showing no intention of fright until an approaching automobile came very close to the horse, was not guilty of negligence contributing to her injuries when the horse shied and overturned her wagon.

LIABILITY FOR SERVANTS' ACTS.

A man, with other people, was standing on a Philadelphia street, about to board an electric car, and as he stepped aside to allow a young woman to get on the car first, a large automobile operated by the owner's son, voluntarily ran into the man, hurling him about 60 feet, and at the same time the automobile struck and killed the young woman.

The defense offered was the lack of authority of the son to use the father's car, he having been told by the garage repair man "to take the car back to the barn" or garage from which it had come.

The trial judge said: There are two kinds of authority—direct or specific, and implied. Now there is no evidence that there was any direct or specific authority given to the son to run the car that night, that is, the defendant did not say to his son so and so is going to make some repairs on this car and take it out, and you go with him and take the car home when he gets through. But authority may be implied from the conduct of the parties; and the evidence on that point is the fact testified to by witnesses that they had seen the son running the car at various times, frequently before the accident with different parties in it.

The Supreme Court of Pennsylvania held that it was an unnecessary burden assumed by the plaintiff in undertaking to show that the son had a reputation for carelessness in driving, such as the defendant ought to have known of, for this fact was unnecessary to make out liability. Liability was fixed if the father was the owner of the car and the son was negligent on the night of the accident, and was acting as the father's agent within the scope of his authority and the pursuit of the father's business, or convenience and not of his own pleasure, business or convenience.

The court further held that it is the duty of an owner to see that his automobile is not run by a careless or reckless person, but that it is in the hands of a skillful and competent person.



“Good Roads Everywhere”

WHATEVER your politics or your religion, every citizen of the United States subscribes to the slogan “Good Roads Everywhere.”

Whether you believe in Preparedness for War—for Defense—for Peace—you believe in good roads. Whatever social, moral, commercial, industrial, educational or personal development you believe in you know that “Good Roads Everywhere” are a vital necessity for the advancement of all, and whether your political faith be of any one of the great parties, or of none of them, you believe in good roads.

The National Highways Association also believes in “Good Roads Everywhere.”

It believes that a four fold system of highways—national, state, county, town or township (three fold if the county is the smallest political unit)—will solve the road problem of the nation.

It believes that the government of the United States and our states can thus double the wealth of our country and treble the happiness and efficiency of our people.

It believes that our farmers who haul over these roads, soldiers who may have to march on them, pleasure seekers who enjoy them, doctors, ministers, school children and all our people who must and do use them, will profit by having “Good Roads Everywhere.” They will add a thousand fold to the worthwhileness of life in America.

It believes that the story told by our maps and pictures is a vital story. We know that these maps and pictures are an argument for what should be. We know our nation should have many, many miles of good roads which go somewhere and do something for everybody.

You may live on a good road or on a poor road—either is convincing evidence of the need of “Good Roads Everywhere.”

Our nation is made up of more than 100,000,000 people. When a majority of them want anything they get it. Every

man, woman and child who sees that “Good Roads Everywhere” is the answer to the majority of our—your—problems, social, economic, political, moral and national, makes that day one day nearer when we, the American people, shall have “Good Roads Everywhere.”

Send for our maps, pamphlets and other literature. Not only will you find

them attractive and interesting, but very instructive. Look at the pictures, read the facts. Look at the maps. Then, if you believe as we believe, help spread the slogan

**“FOUR FOLD SYSTEM OF HIGHWAYS
—NATIONAL, STATE, COUNTY AND
TOWN OR TOWNSHIP” AND “GOOD
ROADS EVERYWHERE.”**

The Westgard-Hochstetter “Know America” Expedition

ALREADY awaiting with curiosity the first Pathe release of the beautiful Pathe-Combitone scenic films made by the Westgard-Hochstetter “Know America” expedition, American women now have an additional reason for interest in the pictures made in Santa Barbara. This reel will show, for the first time, the one spot in America where no woman has ever set her foot or feasted her eyes, the sacred garden of the Santa Barbara mission.

Surrounded by high adobe walls, containing every known tropical plant, and at least one unknown to naturalists, all blessed by the monks and tended with loving care, the sacred garden is held

inviolate from all feminine eyes except those of a reigning queen or the wife of the President of the United States. So far no queen or first lady of the land has taken advantage of the chance to see this guarded spot.

In the belfry of the mission is a small slit, through which a small portion of this garden may be glimpsed with difficulty. Many women climb to the belfry to look, apparently because they are forbidden to see the sacred garden in any other way. Now that it has become possible to invade its blessed precincts with a motion picture camera, the entire world, feminine as well as masculine, may see the beauties of this strange collection of tropical verdure, in spite of the prohibition which surrounds it. As the finished films are made by the Combitone process, the remarkable discovery, by which from eight to 10 color tone gradations are obtained, the illusion of reality is practically perfect.

All the pictures are real pictures, and in all the glory of color of the Hochstetter process, and with the resources of the Pathe distribution service, will fill an educational need so far unsatisfied. It is because of their unusual character and magnificent possibilities that they are being made under the auspices and with the co-operation of the Department of the Interior of the Federal Government and the National Highways Association.

Motors on Mount Desert

IF CERTAIN legislation is enacted in Maine the motorists of the country may before long have the privilege of enjoying from their automobiles the beautiful scenery of Mount Desert, for Bar Harbor now wants the state to build a bridge connecting the island with the mainland in order to accommodate the automobilists. It is only a short time ago that Bar Harbor was fighting “tooth and nail” to prevent motorists from operating their cars on the island.

**GASOLINE GAGE.**

(Figure 321 A.)

How often, when you desire to find the depth of the gasoline in the tank and try to measure it with a rule, do you find that by the time the rule is removed the gasoline on it has evaporated and you cannot tell just what the correct level is? Bend a wire as shown in our cut and slip it through a cork. Put the apparatus in the tank, squeeze the free ends to allow the cork to float to the top of the gasoline. The spring of the wire will hold the cork in position. It is an easy matter to determine the amount of gasoline in the tank, by removing the device and noting the distance the cork is from the bottom of the wire.

CUTTING A KEYWAY.

(Figure 321 B.)

The amateur mechanic is often puzzled to know just how to proceed to cut a keyway in a shaft; the cold chisel method requires considerable skill, and very few amateurs are successful in its application. The following suggestion may prove helpful. In a block of hard wood about four or five inches long and about four inches square on the ends, bore a hole lengthwise, slightly larger in diameter than the shaft which is to be splined. Cut a strip from this block so that when it is removed the slot thus formed will extend from the surface to the hole in the centre and is the width required for the keyway. Two pieces of hack saw blades are placed in this slot, one on each side, and the strip is forced back again. The blades will extend into the hole and bear against the shaft. By moving the block back and forth on the shaft the sides of the keyway will be formed. It will then be an easy matter to remove the surplus stock with a cold chisel.

There are tonneau, dash, cowl, engine and speedometer lights, but there seems to be no provision for illuminating the running board, except as special features. If cars were equipped with a light for this purpose many accidents would be averted.

A tin can with the bottom removed and a cover fitted to each end makes an excellent case for holding spare electric light bulbs.

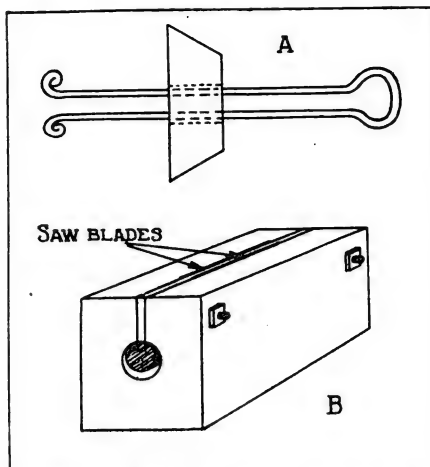


Fig. 321—A, Gasoline Gage; B, Device for Cutting Keyways.

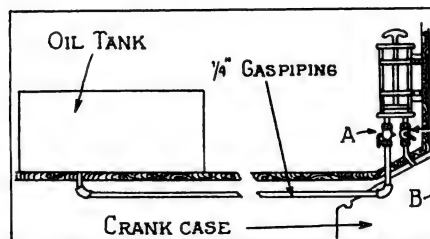


Fig. 322—Improved Oiling for Ford Car.

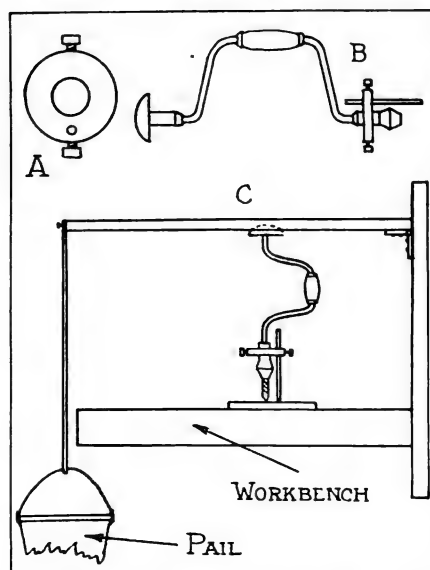


Fig. 323—Drilling Attachments.

FORD OILING SYSTEM.

(Figure 322.)

A handy oiling system for a Ford car may be assembled from a tin box, a length of gas piping, two shut-off cocks, two elbows and an old pump or grease gun, as shown in our illustration. The tank may be placed under the rear seat. The device is operated as follows: When cock A is opened and cock B closed, the plunger is drawn upward and by this action the pump is filled with oil from the tank; B is then opened and A closed, and as the plunger is pressed downward the oil is forced into the crank case. This device eliminates the necessity of handling dirty and messy oil cans.

Strips of lead sewed to robes and blankets used on the automobile will be found of great assistance in holding them down to keep out wind and cold.

DRILLING ATTACHMENTS.

(Figure 323.)

The amateur mechanic quite frequently finds that he is unable to drill holes in metal without a great deal of effort, and when the holes are so drilled they may be at most any angle with the surface, to which they should be at right angles.

The material for making the apparatus suggested herewith consists of a carpenter's bit brace, an iron collar, a piece of $\frac{1}{4}$ inch round iron rod, a length of board and a piece of rope. The collar should be large enough to fit over the end of the bit brace and should be provided with a set screw to hold it in place. Near the outside of the collar bore a hole large enough to receive the $\frac{1}{4}$ inch round iron rod. Provide this hole with a set screw as shown at "A." Remove the chuck from the brace and slip the collar into place. The $\frac{1}{4}$ inch round iron is put into place and the brace assembled as shown at "B." The length of board is hinged to the side of the wall over the work bench. About two feet from the wall a small concave hole should be gouged out of the board to fit the top of the brace.

To use the apparatus place the piece of iron in which the hole is to be made beneath the hole in the board; the bit with drill is placed above it as shown in our illustration. The $\frac{1}{4}$ inch round iron is first used to "centre up" the work, which is so placed as to allow the end of the $\frac{1}{4}$ inch round iron rod to touch the

surface all around the circle described by it. The iron rod is then drawn back and forms a depth gauge. A weight, such as a pail of water, is suspended from the end of the board. Our illustration clearly shows the apparatus when assembled. With this the hole may be drilled to any predetermined depth and it will always be at right angles to the surface.

TOOL BOARDS.

(Figure 324.)

"A place for everything and everything in its place" is a good motto for the automobilist. Many a motorist boasts of a stock of tools which he has picked up from time to time from the road where another less fortunate one has left a portion of his tool kit.

Our illustration shows the general method of constructing a tool board. The board should be about 12 inches square. The tools should be arranged upon it in any convenient order and held in place by strips of leather. These strips are threaded through holes in the board, and are drawn up tight from the ends. One board may contain tire tools, another engine tools, wrenches, etc., and another special tools. It is an easy matter to keep the tools in their respective holders and the absence of a tool is quickly noted. The board makes a very handy portable tool chest, and may be removed from the machine at any time to prevent theft.

BRAKE CAM REPAIR.

(Figure 325 D.)

It frequently happens that the brake cam or brake lining becomes so badly worn as to prevent the setting of the brake when the cam is at its extreme position. A simple remedy for this fault is shown in our cut. It is accomplished by boring and tapping a hole in the brake cam at its largest diameter and screwing in two machine screws. The heads of the screws make possible a wider expansion of the brake band.

GARAGE OIL PUMP.

(Figure 325 A.)

The oil pumps used in garages for transferring oil or gasoline from barrels frequently are lots of bother because of leaking joints and improper packing. Our illustration shows a handy arrangement for this purpose, it having no packings to cause trouble. The whole apparatus is composed of pipe fittings and a wooden or cork stopper. The sketch clearly shows the construction, in which $\frac{1}{4}$ -inch gas tubing is used. The apparatus works as follows: The stopper "C" is driven into the barrel and air is forced in through the pipe "B" by an air pump or from a compressed air tank. The air pressure in the barrel displaces the oil or liquid, which is thereby forced up through the pipe "A" into the container. The height to which the liquid may be forced is dependent only upon the air pressure through "B."

AUXILIARY AIR INTAKE.

(Figure 326.)

In a great many cases much fuel may

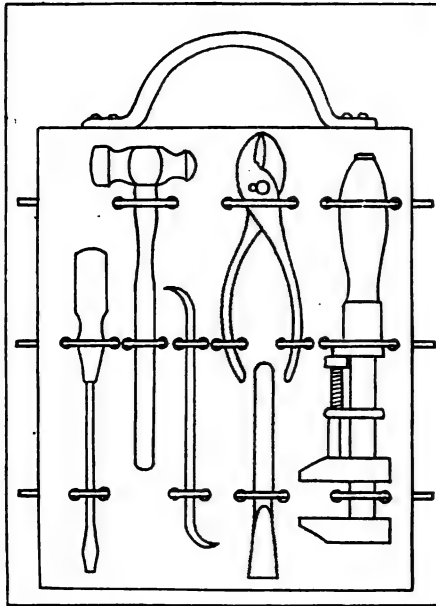


Figure 324—Handy Tool Board.

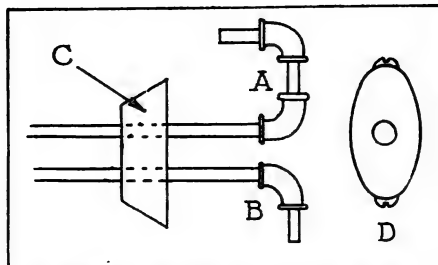


Fig. 325—A, Garage Oil Pump; D, Brake Cam Repair.

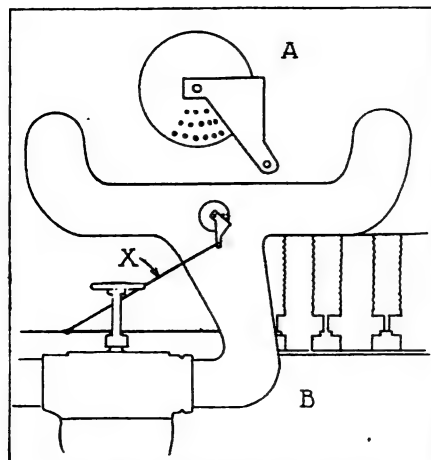


Fig. 326—Auxiliary Air Intake.

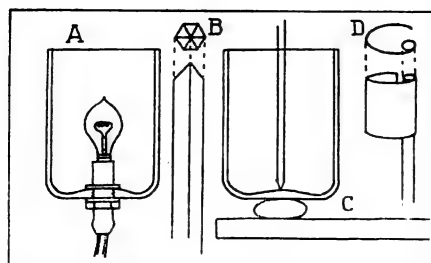


Fig. 327—Lamp Protector.

be saved if an extra air supply is provided for the engine when running on the higher speeds. You can make from a grease cup, a piece of sheet brass and a length of heavy wire an auxiliary air intake that will prove as efficient as many on the market. The cap of the grease cup should be perforated to make a number of holes in a triangular pattern, the piece of brass cut into shape and riveted to the centre of the cap and left free to swing on its centre so that by its movement the holes may be covered or uncovered. (See A.) The assembly is then screwed into the intake manifold, as shown at B, and a wire run from the piece of sheet metal to the throttle wire. As the throttle is opened and the engine speeded up the holes in the cup are opened by the throttle action and more air is admitted. When the throttle is closed, or nearly so, the air is prevented from entering. The correct setting and length of the wire, X, can be determined by experiment.

BOTTLE LAMP.

(Figure 327.)

Our illustration shows a handy lamp, the bulb of which is protected from breakage by a heavy glass bottle. This type of lamp has the advantage over the ordinary wire protected lamp in that no shadows are cast by the protecting cover. The lamp and fitting is standard. The fitting has two lock nuts, between which the glass cover is clamped. To the amateur the drilling of the hole in the bottle would seem to be the biggest task. This is not so, however, the boring of the hole being made easy by following these instructions.

Grind the corners of a three-cornered file on the end to form a hexagonal point, as shown at B. This point should be rather blunt. The hole is drilled from the inside of the bottle, a piece of putty being placed beneath the bottle to prevent the glass from cracking and to hold the pressure of the brace in which the file is used.

The method is shown at C. From time to time a drop of crude oil is placed upon the point of the file to aid the cutting. As soon as the point of the file cuts through the glass the bottle should be turned over and the hole should be finished from the outside.

Having pierced a small hole through the bottle in this manner, proceed as follows to enlarge it. A piece of tin is tacked to a stick, as shown at "D," and this is inserted in the hole and revolved in the direction shown by the arrow. A little emery and water is placed upon the tin to facilitate grinding. The result will be a smooth, round and large enough hole to fit over the lamp socket.

AUXILIARY AUTO SEAT.

(Figure 328.)

In our illustration are shown two views of an easily constructed auxiliary automobile seat. The dimensions will, of course, vary according to different cars. The outline of the seat is shown at A, the side view at B. In the side view also is shown the way in which the device may be folded up and placed against

the seat. The auxiliary seat is hinged to the permanent seat and to it the leg is fastened by another hinge.

EXHAUST HEATER.

(Figure 329.)

Our illustration shows a practical exhaust heater which can be made in a short time by anyone having a pipe threading tool. The exhaust pipe is cut at a point between the exhaust and the muffler and a pipe T is screwed to it. Two pipes are screwed to the T, one going up through the floor of the car to an elbow, "X," into which is screwed a short length of piping, which forms the heater. The other connects with a second T. From the second elbow on the heater a pipe is run to the second T, which is connected with the muffler by another pipe. It is desirable to have the Ts in line so as to form a straight exhaust line from manifold to muffler.

The size of the heater pipe itself may be varied by using reducing elbows, as at "X" and "Y." If it is found that the device furnishes too much heat, it may be covered with asbestos and painted to match the finish of the car. A butterfly valve may be fitted in the pipe at "M" to regulate the heat supply.

FOOT SCRAPER.

(Figure 330.)

There is just as much reason for removing the mud from the shoes before entering an automobile as there is before entering a house. The accompanying illustration shows an easily constructed scraper made from wood, which is both sanitary and cheap. The strips of wood are 10 inches long, $\frac{3}{4}$ of an inch wide and $\frac{3}{8}$ of an inch thick. Each strip is beveled as shown at A and a heavy wire is run through both ends and the centre as shown at B. The ends of the wire are threaded and fitted with nuts and washers. At C the scraper is shown when assembled. When complete the scraper should be given a coat of paint to match the car.

A TRAILER SUGGESTION.

(Figure 331.)

Mr. Herbert Mansley has made the following suggestion, which should be of interest to those desiring a trailer at a minimum cost.

He bought an old runabout for \$10, took off the body, removed the engine and transmission and covered the differential with a piece of sheet iron to keep out the dirt. The engine and other junk parts he sold for about \$5.50. The frame was then boarded up and sides put on. The steering arrangement was removed and a hole bored in the steering rod at the centre and another in the axle. One bolt in each of these holes held the long

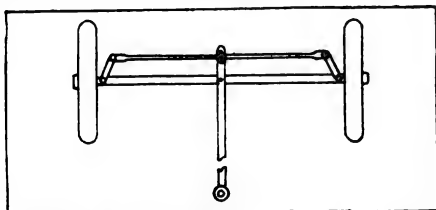


Fig. 331—Trailer Suggestion.

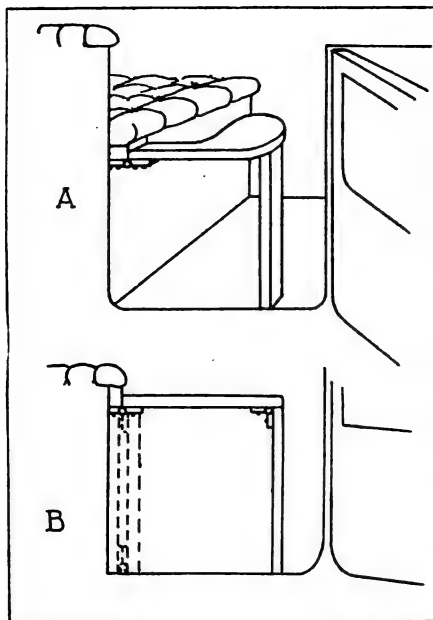


Fig. 328—Auxiliary Auto Seat.

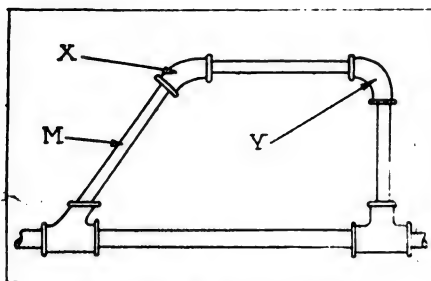


Fig. 329—Exhaust Heater.

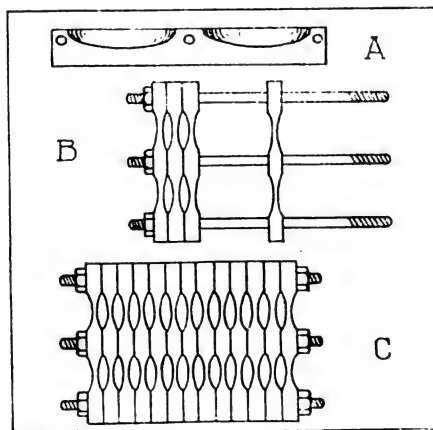


Fig. 330—Foot Scraper.

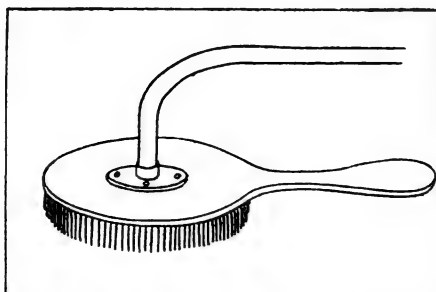


Fig. 332—Garage Brush.

iron steering arm by which the trailer was towed. Our illustration shows the steering arrangement. It should be noted that the steering arm is slotted for the bolt in the steering cross rod.

We give this suggestion because we believe that there are many old automobiles in the junk yards around the country that may be used for above purpose, their day of usefulness as automobiles having passed.

GARAGE BRUSH.

(Figure 332.)

We show in our illustration an easily constructed water brush for washing mud and grease from an automobile. The bristles are cut away from the centre and a $\frac{1}{2}$ -inch hole is bored through the back of the brush, a $\frac{1}{4}$ -inch iron pipe flange is screwed to the outside, as shown, and a pipe nipple is attached to the flange and connected with the water hose. When used the mud or grease will be loosened by the bristles and washed away by the water which enters through the back of the brush.

SHOCK ABSORBER.

(Figure 333.)

A subscriber residing in Rhode Island has made a shock absorber which he constructed very easily. A piece of cast iron of oval shape is bolted to the frame of the car (see "A"). Most any junk yard will furnish such a piece of iron, or, it can be obtained from a foundry from a wooden pattern which is easily whittled out with a knife. Around this oval a heavy piece of iron is bent. One end of the iron is twisted at right angles and fastened to a shorter length of iron, "C," by a single bolt. The other end is looped over and a bolt passed through it, fastening it to itself, as at "D." A spring is placed between the end of the bolt and the iron and also between the end of the iron and the bar itself.

The free end of "C" is fastened by a single bolt to a clip on the axle. To give good service the iron should be about $\frac{3}{8}$ inch thick, $1\frac{1}{2}$ inches wide. The oval should be about three by two inches. The distance between the outer edge of the oval and the centre of "C" should be about eight inches.

When the car is at rest with no load the absorber should be in the position shown in the cut. As the body of the car drops the oval is slightly turned on its centre, bringing a pressure with friction on the arm, which tends to pull the oval back to its normal position. The same thing happens when the car "jumps." The action of the shock absorber is controlled by the tension of the iron strap on the oval, which is adjustable at the bolt "D."

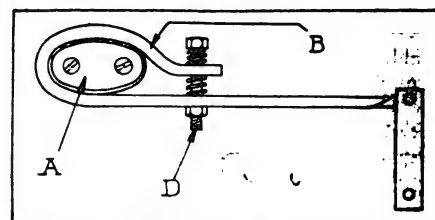


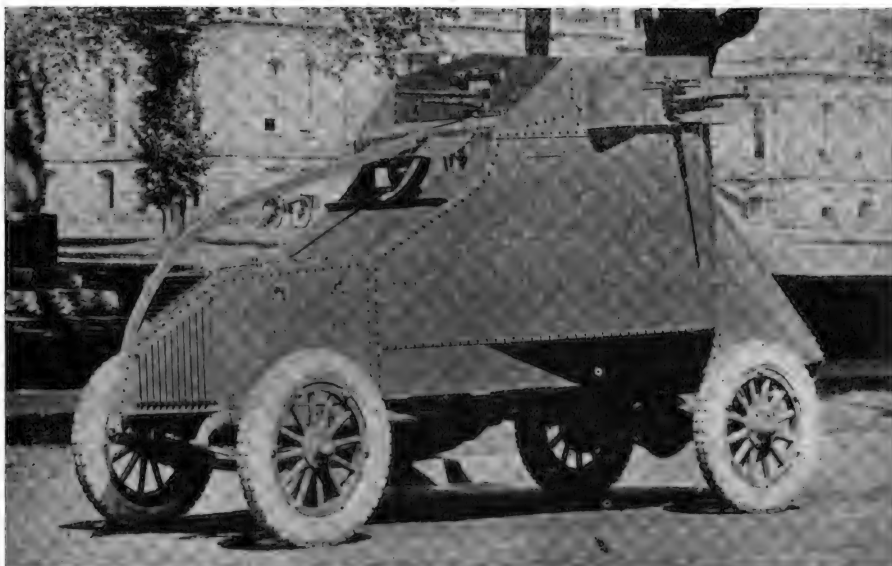
Fig. 333—Shock Absorber.

Featuring Motor Trucks In the Day's News



There seems to be almost unlimited possibilities for the employment of commercial vehicles, a few of the tasks to which they have been set during recent months being shown on this page.

A motor truck adapted to be run on rails is one of the purposes in which the members of the Midlothian Country Club of Chicago found a one-ton International truck a valuable feature. It is used to convey members from a railroad station to the club house, a distance of $2\frac{1}{2}$



miles. A round trip costs about 10 cents for gasoline and oil.

Armored motor trucks are now quite common. The one shown at top of page

is a Reo machine, especially equipped with armor after the design of Horace T. Thomas, chief engineer. The Reo company gave it to the Michigan militia.



Just below the war car is a view showing how a Connecticut contractor moved a five-room house in Bridgeport by means of a $3\frac{1}{2}$ -ton Selden truck. The house weighs 20 tons.

Trucks are even used in circus life, as is shown in the view of three Republic machines that are part of the traveling equipment of the Levitt-Taxier Shows United, a Western enterprise.

The remaining two views illustrate the use of White trucks in public service work, that at the left showing how they haul water pipe at Lynn, Mass., and at the right how they are used to tear up abandoned railroad track.





GILL PISTON RING.

The Gill piston ring is of one-piece construction of the concentric type, and with a joint so constructed that it can be opened more than $\frac{1}{8}$ inch without there being a direct opening through which oil or compression can pass. The construction of the joint eliminates the use of an extra part to close it. Each ring is made from an individual casting, the scale being left on the inside surface to insure a permanent tension. The joints are cut from the rough castings, and rings are ground with the joints closed, which insures it being a perfect circle when closed.

Marketed by Craig-Wyman Co., 93 Massachusetts Ave., Boston, Mass. Prices from \$1 to \$1.75 according to size.

IDEAL JUNIOR SEAT.

The Ideal Junior Seat will fit any make of automobile now on the market. It is substantially made and finished and when in place becomes a part of the automobile. A bracket is fastened to the floor board with three bolts and always remains on the car. This bracket has a tapered hole for receiving the upright seat support, the end of which is also tapered to fit bracket. Similar arrangement is made on the bracket fastened to underside of seat. This feature makes it a simple matter to detach the seat from the car, detach upright support from seat and store away in a very small space.

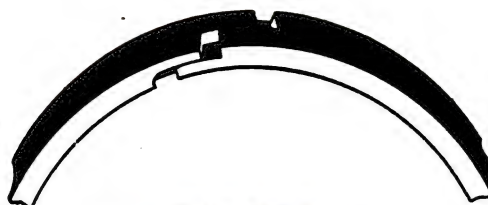
The seat can be adjusted from side to side or front to back for a distance of six inches when desirable, but when in place the tapered sockets do not permit seat to turn or swing around.

Manufactured by Ideal Brass Works, Indianapolis, Ind. Price, \$2.50 each, complete with bolts.

DRIVE SHAFT SUPPORT.

Ekern's drive shaft tube support for Ford cars is made of malleable iron, and is constructed so that it clamps to the drive shaft tube and holds it rigidly to the differential housing. The manufacturers claim that it eliminates all vibrations that tend to cause the drive shaft tube to become crystalized and break. It is claimed that this attachment can be put on in 10 minutes by anyone. Weight is six pounds.

Manufactured by Ekern Bros. Mfg. Co., Flandreau, S. D. Price, \$3.50.



Gill Piston Ring.



Wrought Steel Back Catch.



Ideal Junior Seat.



Drive Shaft Support.

WROUGHT STEEL BACK CATCH.

The Stanley line of garage hardware has been extended by the addition of a wrought steel back catch for $1\frac{1}{4}$ -inch garage and barn doors. The catch holds the door firmly against the side of the building. Opening the door forces the stout hook over the catch plate, where it is held by the double leaf spring. Slight pressure on the thumb piece releases it. When the door is swung open its momentum is checked and absorbed by the escutcheon plate, which is struck up and takes the shock off the hook. The screw holes in the catch plate are slotted so that it can be adjusted to meet the bumper squarely. They are furnished in either Stanley japan or sherardized finishes.

Manufactured by the Stanley Works, New Britain, Conn. Prices on application.

TWO NEW PREMIER PRODUCTS.

The Premier line of products, which are designed to meet every motorist's needs, has been expanded by the addition of Premier Spray and Premier Enamel Cleaner. The first named product is used either with a sprayer or a soft cloth and is intended to clean, polish and afford a lasting finish with a durable and brilliant luster. Applied to a new car it keeps the factory finish, and applied to an old machine it revives the luster. It also can be used in the home or office, on furniture, floors, etc.

Premier Enamel Cleaner is applied with a soft cloth, it almost instantly removing dust, road oil and tar and other blemishes from all baked enamel surfaces, such as fenders, hoods, fillers, etc. The makers lay stress upon the economy of its use, the amount required being about half that of ordinary polishes. Premier products contain no acids, alkali or grit and are used by a great many of the largest manufacturers of high grade machines and also recommended by them to their dealers and users.

Manufactured by the United Chemical Co., Boston, Mass., and sold by most dealers. Prices sent upon request to the company.

WEGMANN DECARBONIZER.

A decarbonizing device that will remove carbon from the cylinders and keep them free from carbon, will not only add great power to the engine, but will also

save the owner much expense in fuel and repair bills. Such a device, known as the Wegmann automatic decarbonizer, is attached to the intake manifold and to the water supply pipe or water jacket and injects a fine spray of steam with the gas into the combustion chambers. When first applied the engine is allowed to race with the adjustment on the device wide open, permitting a small stream of water to pass into the combustion chambers, where it is turned to steam. It is claimed that all the carbon will have been removed in 15 minutes. The adjustment is then closed to a point where from 30 to 60 drops of water a minute are allowed to pass into the cylinders, which is the permanent adjustment and will keep carbon from forming within the engine. The device works automatically, opening when the engine is started and closing when it is stopped.

Manufactured by the Manufacturers' Distributing Co., St. Louis, Mo. Price, \$5.

KNIFE TIMER FOR FORDS.

The Dean Knife Timer for Ford cars presents a new principle in timers for automobiles. The knife contact, from which it derives its name, is made by two hard tempered 60-degree dynamo steel spring blades passing over both sides of the high tempered tool steel terminals, not coming into contact with any other substance or metal. It is enclosed in a shell constructed of a special metal which will draw less moisture than steel and is insulated to eliminate possibilities of short circuiting.

Manufactured by Tisch Auto Supply Co., 215 Division Ave., S., Grand Rapids, Mich. Prices upon application.

COMER AUTO-STOP SIGNAL.

The Comer Auto-Stop Signal combines the conventional rear signal light hanger for number plate and a semaphore arm set with opaque celluloid letters reading "Stop." This arm can be seen for a distance of 200 feet from the rear of the car and at night is illuminated with a bright light. The operation of the arm, which is the feature of the device, is automatic and does not depend upon any extra movements on the part of the operator of the vehicle. The instant the pressure is applied to the brake by the driver the semaphore signal is thrust out to right angles, flashing its signal, and when pressure on the brake is released it is returned to its normal position.

Manufacturers Auto Signal Co., Chicago, Ill. Prices on application.

COCHRAN SPRING OILER.

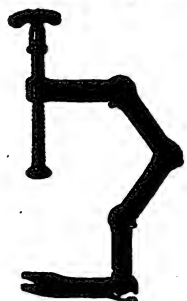
Unless you keep your car springs well lubricated their efficiency and usefulness is greatly impaired. However, it is generally a difficult task to put the oil between the leaves without special tools for the work. The Cochran Spring Oiler is designed to facilitate the work. To use the tool, simply take the weight off the spring. Insert the oiler, as shown,



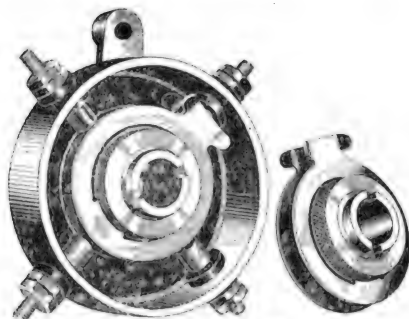
Wegmann Decarbonizer.



Back Ease Cushion.



Universal Clamp.



Knife Timer for Fords.



Comer Auto-Stop Signal.



Cochran Spring Oiler.

and the oil will be carried to the centre of the leaves.

Manufactured by Cochran Pipe Wrench Mfg. Co., 7800 Woodlawn Ave., Chicago, Ill. Write for price.

BACK-EASE CUSHIONS.

The pleasure of a long ride is often marred by back strain. The Gordon Back-Ease Cushion is made in triangle shape, wider at one end than at the other, and is intended to rest on the seat against the back to relieve the strain upon a passenger. It may be used with either the small or large end upward. It is covered with artificial leather and filled with a good grade of upholstery filling.

Made by the J. P. Gordon Co., Columbus, O. Price, \$2.50.

UNIVERSAL CLAMP.

As the name indicates, the Crescent Universal Clamp is an all around, universal tool. It is made of the best malleable iron with steel screw and square cut threads. It can be adjusted from a straight bar to a hoop, and presents a rigid position at all angles. It has many uses; as a valve lifter it may be adjusted to fit practically any valve system, it can be used as a straight or off-set bar for close work around the engine and is of assistance in removing tires.

Manufactured by Chas. D. Durkee & Co., 2 South St., New York City.

RUBBER TIRE FILLER.

The National Rubber Tire filler is a substitute for pneumatic inner tubes. This tire filler is made of the best quality of rubber, cut in small particles and vulcanized together, and then cut into sections for inserting in the tire casings. The makers claim that a shoe thus filled rides as easy as air and cannot be punctured. Tire mileage is doubled and tire repair bills eliminated. Tire filler can be used in all style tires.

Distributed by New England Equipment Co., 45 Milk St., Boston, Mass. Prices from \$13.50 for 28x3 tires to \$39 for 37x5½ tires.

AUTOPEP.

Autopep is a vitalizer for gasoline, naphtha and kerosene and also a carbon remover and eliminator. It is made in granulated form, resembling coarse granulated sugar, and put up in air tight tin containers. A certain amount of it is dissolved in the gasoline.

The manufacturers claim that Autopep will remove carbon, prevent carbon deposit, increase power and lengthen mileage. They also say that it is void of acids and chemicals and will not harm the engine, tank or tubing in any way, even after prolonged use.

Manufactured by Autopep Products Co., represented in New England by James L. Holland, 18 Tremont St., Boston, Mass. Price \$1 for amount sufficient for treating 100 gallons of gasoline.

CLEAR-O-SCOPE WIPER.

The Clear-O-Scope windshield wiper is intended to keep the portion of the windshield through which the driver has to observe his course, free from rain, sleet and snow. It is readily applied to the top of the shield and does not make necessary any changes or the boring of any holes. One stroke either to the left or right cleans off a large area on the outside of the windshield.

Manufactured by the Clear-O-Scope Co., 738 West Madison St., Chicago, Ill. Price, \$1.

SPECIAL TIRE COVER.

This tire cover is made to fit tires on demountable rims carried on special holders. It is easily attached, being divided at the head of the tire, permitting it to be formed to each side and fit smoothly and securely and protect the tire from oil, dampness, dirt and heat.

Made by the J. P. Gordon Co., Columbus, O. Prices from \$1.80 to \$3, according to size.

IECO STEER WARMS.

Ieco Steer Warms, which are electrically heated pads, are designed to keep a driver's hands warm while operating a car in cold weather. They are constructed to be laced on those portions of a steering wheel where an operator generally places his hands while driving, and they are heated by current from the car's generator. The makers claim it is impossible to overheat the pads, because in them are incorporated specially constructed resistance devices that prevent the heat from attaining to higher than a certain predetermined degree.

Manufactured by the Interstate Electric Co., New Orleans, La. Price for Ford car type, \$5; for others, \$7.50. When ordering specify make of car and voltage of battery.

ATOMIZING PRIMER.

Longest's Atomizing Primer is designed to make the starting of an engine in cold weather an easy operation, by making it possible to thoroughly vaporize the fuel before it is sent into the cylinders. The device is attached to the intake manifold, and is made in two models. Model one is filled by hand, while model two is connected directly with the gasoline supply system.

Manufactured by Longest Bros. Co., Louisville, Ky. Price for model one, \$2.50; model 2, \$5.



Remagnetizer.



Two Views of Clear-O-Scope Wiper.



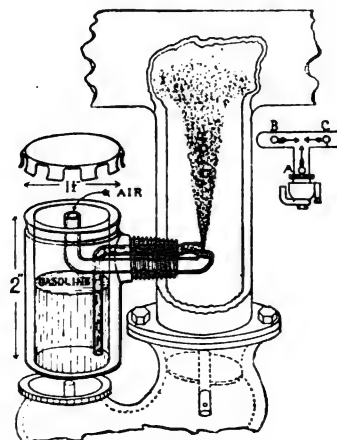
Special Tire Cover.



Ieco Steer Warms.



Rear Axle Truss.



Atomizing Primer.

REMAGNETIZER.

With the increasing number of electrical generators there is a growing demand for apparatus for enabling the owner and repair man to remagnetize the permanent magnets of such apparatus. The device in the illustration is called the Ford Special Remagnetizer, and is intended to be used to restore the magnets in the Ford car magneto, without being obliged to remove them first from the car or disassemble the magneto or transmission. When used for this purpose only the cover of the transmission need be removed. The remagnetizer is operated by current from storage batteries, dry cells, or through resistance bank from lighting current.

Manufactured by Townsan Auto Specialty Co., 822 Western Ave., Minneapolis, Minn. Write for prices.

REAR AXLE TRUSS.

Hoyts' rear axle truss is designed for Ford cars and to prevent the rear axle from sagging, to relieve undue strain on differential, and keep the differential housing in condition.

Manufactured by Hoyts Auto Supply Co., 370 Fairfield Ave., Bridgeport, Conn. Price, \$1.50.

PITTSBURG PARABOLITE.

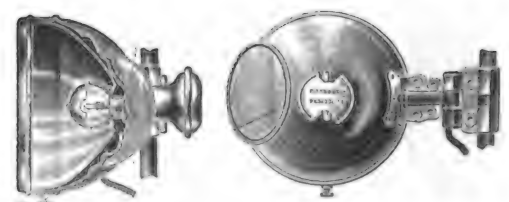
The Pittsburg Parabolite is a new type of spot light with a patented parabolite reflector designed to concentrate the full power of the light wherever the operator wishes it to fall and does not glare beyond the area covered by the beam. It is claimed that it produces a beam of light that is effective at distance for practical purposes and gives great beam candle power per lamp power, minimizing both lamp cost and current consumption. It is easy to attach and adjust. It has a four-inch diminishing mirror and nitrogen lamp.

Manufactured by the Pittsburg Electric Specialties Co., Pittsburg, Penn. Price, \$7.50.

INAJIFFI FUEL TABLETS.

Inajiffi fuel tablets are intended to clean the carbon out of the engine and to use in gasoline for producing more mileage. They are guaranteed and money will be refunded after a trial if the tablets do not do all that is claimed for them. For removing carbon 40 tablets are put in 10 gallons of gasoline.

Marketed by S. R. Dexter Co., 107 Massachusetts Ave., Boston, Mass. Price for box of 200 tablets, \$1.



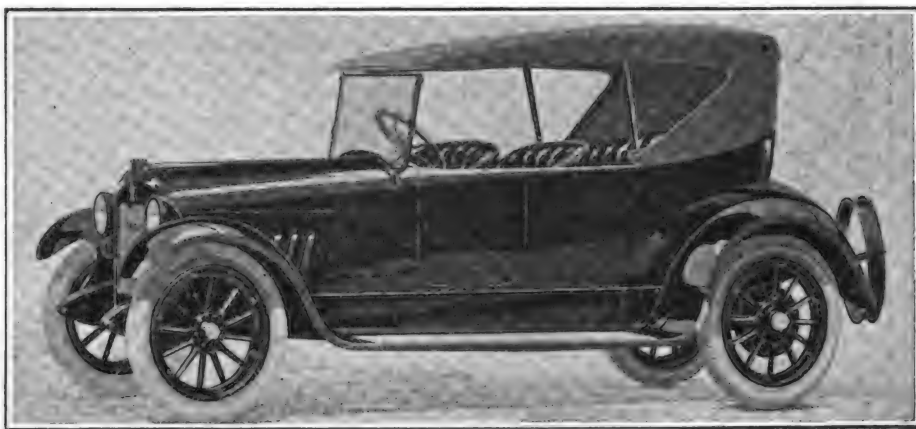
Pittsburg Parabolite.

Case Announces Its New Models for 1917

THE outstanding feature of the external appearance of the new 1917

Case model 40 cars recently announced by the J. I. Case Threshing Machine Co., Racine, Wis., is the graceful lines of the bodies, as well as the capaciousness of the seating compartments. These models constitute the 1917 line of the Case company and consist of a so-called "flexible four" and a "tourabout," both of which are mounted on the same type chassis. A selling price of \$1190 has been set on both models.

The "flexible four" is a five-passenger machine, which may be converted into a seven-passenger car by utilizing the two auxiliary seats provided. These seats are folded against the backs of the front



Side View of the Case 40 Touring Car.

drop forged and driven by noiseless helical gears. Upon this run the valve push rods, which are adjustable and operate on rollers that make the assembly practically noiseless in operation.

Oil is furnished to the crankshaft and camshaft bearings by a force feed pump, and an indicator on the dash shows at all times the working of the pump. Wristpins and cylinder walls are lubricated by the splash system, and the amount of oil in the crank case is indicated on a gauge.

Cooling is accomplished by the thermo-syphon system and a large radiator of standard type.

From a 13-gallon tank in the cowl the gasoline is carried by gravity feed to a Rayfield model M3 carburetor, which has a dash adjustment.

An Auto Lite generator, running

1½ engine speed, with third brush regulation, has a Connecticut high tension distributor vertically mounted upon it for ignition, and furnishes approximately six volts when running at a car speed of 15 to 25 miles per hour. This generator is driven by spiral gears from the camshaft, and its output is used for charging a Willard three-cell, 90 ampere-hour storage battery for lighting and ignition.

An Auto Lite six-volt starting motor with Bendix drive, by a pinion, which engages with teeth cut into the semi-steel flywheel, turns the motor over for starting.

A cone type clutch provided with fiber disc brake and means for spring adjustment is mounted on the crankshaft and in the flywheel.

The transmission, which is of the selective type, forms a unit with the engine and is equipped with Timken bearings, arranged for left hand drive with centre control.

The rear axle is a Salisbury floating type, with spiral bevel gears in a ratio of

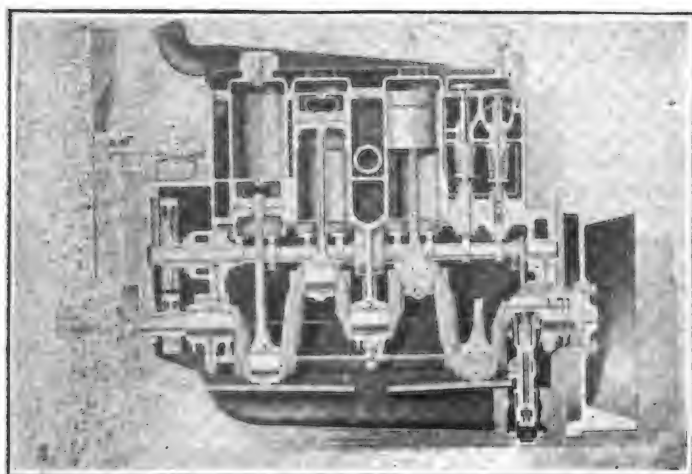
4 5/12 to one. The brake drums, the internal one being 14 inches and the external one being 14½ inches diameter, are each two inches wide.

Description of Springs.

Rear springs are composed of 10 leaves. The springs are 50 inches long, 2½ inches wide, and are cantilever type. The front springs are semi-elliptic, nine leaf, 37 inches long and two inches wide.

All wheels are of the artillery type, carrying 34x4 Goodyear detachable tires on demountable rims.

A specially designed front axle of in-



Power Plant of Touring and Tourabout Models—Sectional View of Motor.

seats when not being used. The "tourabout" is a four-passenger roadster.

The body is seen to be roomy, and the upholstery deep and luxurious. The top is of the "one-man" type and is adjustable in a minimum amount of time, folding up with the side curtains in a dust hood when not in use.

Features of the Engine.

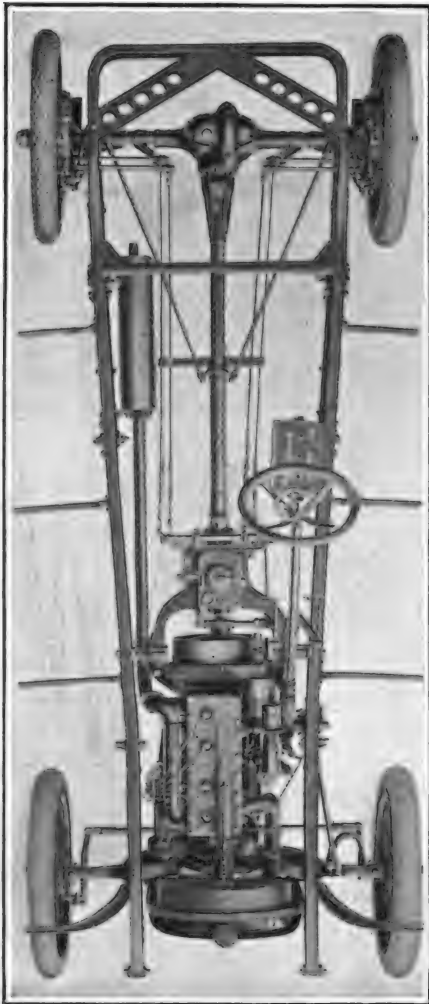
A four-cylinder, L head engine, cast in block and integral with the crank case has a bore of 3½ inches and a stroke of six inches, furnishing 40-45 horsepower at 2100 revolutions per minute, or 21 1/12 horsepower by the S. A. E. rating.

One of the features of the Case engine is its removable cylinder head. By disconnecting only a few parts and removing the nuts at the top of the cylinders the head of the engine may be readily lifted, affording access to pistons and valves.

Three of the well known Gill piston rings are provided for each piston, in addition to a wiper ring. The camshaft is



Seating Arrangement Case 40 Touring Car.



New Case 40 Chassis, Showing Rugged and Neat Construction.

verted Elliott type, I beam section, is fitted with Timken bearings.

Steering is accomplished through a Jacox worm and split nut type gear, with 18-inch diameter wood steering wheel on the left hand side of the car.

An ammeter, gasoline gauge and Stewart speedometer, mounted upon the dash, are within easy view of the driver and form a part of the regular equipment. In addition to these are: A tilted, windshield, a one-man top with dust hood and curtains, kit of tools, tire repair outfit, "exploring" lamp and a motor driven horn.

NATIONAL PARKS ARE OPEN TO MOTORISTS.

Yellowstone, or Rocky Mountain National Park, Colorado, will be the mecca this spring, summer and fall for thousands of motorists, as the officials in the Department of the Interior have taken off the ban on motor cars that formerly prevented their use in the park confines.

The stage coaches that were used so many years in taking tourists through these scenic wonderlands have been abandoned and half a million dollars is being spent on an elaborate automobile equipment, including conveyances to accommodate from four to 20 people, which

will be stationed at Cody, Wyo., the eastern entrance, and Gardner, Mont., the northern entrance to the park. These same facilities will also be provided for Rocky Mountain Park, which was formerly called Estes Park.

The railroads will co-operate with other organizations in promoting touring in the parks this year. P. S. Eustis, passenger traffic manager of the Burlington road, has announced that special accommodations will be furnished motorists through the automobile bureau of his department. Provisions will be made for shipping machines, either singly, or neighbors may club together and ship in quantities to and from the parks. By shipping in carload lots the cost to each individual will be nominal.

The new eastern entrance to the park at Cody, Wyo., has become the most popular one, as the automobile road from that point to Lake Hotel has been pronounced by tourists as the greatest 90 miles of scenic highway in the world. Tourists driving over the Cody road will pass through the Giant Canyon of the Shoshone river and Mount Sylvan Pass, and through the evergreen covered mountains, reaching the park at the palatial Lake Hotel.

Mr. Eustis in speaking of the new order of things in the park says:

"The motorization of the park should bring about the doubling of the attendance at Yellowstone during the coming season. Those who desire to see the attractive points in the park will be able to do it in less time, if they desire, than heretofore. Certainly there will be an incentive to others to remain longer in the park because of the numerous side trips that may be made by automobiles."

WOULD CALL ON AUTO OWNERS.

The officials of the Worcester Automobile Club have made plans for the mobil-

izing of 2500 automobiles and 500 trucks in case the militia is called out in connection with the present foreign trouble. Owners were notified of the club's plans in the following circular:

Owners of motor cars and trucks with comparatively little inconvenience to themselves or their commercial or social interests can render incalculable service to the military organizations of the city if these organizations must be mobilized. This was demonstrated last June, but very few of us knew it, and consequently we had no part in the making of the splendid



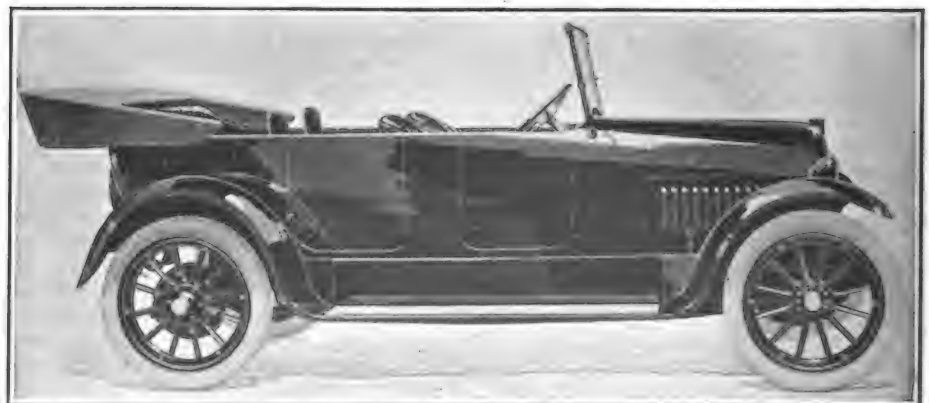
Roomy Tonneau of Case 40 Touring Car, with Auxiliary Seats Folded.

record of our soldier boys.

To aid in the mobilization then it was necessary for the captains of the military companies to hire motor cars. There is no provision in the military regulations to meet the cost of such service, therefore the expenditures were from the company treasures and that in the end meant it was money taken from the men going into service. The cost of hiring motor cars meant a reduction of comforts the men had when away from homes and friends.

PICTORIAL HISTORY OF NATIONAL.

The National Motor Car and Vehicle Corp., Indianapolis, Ind., has issued a very interesting and novel little booklet entitled "Fours to Twelve," which gives a pictorial history of the development of the National car from the time when a four-cylinder motor was used as the power plant up to the present model, which has a 12-cylinder engine. Pictures of the famous National racing cars are also shown with the drivers that piloted them to victory.



The New Case Tourabout, Convertible Into a Seven-Passenger Car.

Many Features in the Newest Westcott Series

MANY refinements, both in body work and in mechanical details, are announced in the new Westcott Series 17 of five individual bodies, designed to be fitted to one chassis. The cars listed in the series include models having five and seven-passenger touring bodies, and a four-passenger roadster. The makers are the Westcott Motor Car Co., Springfield, O. The company in the announcement of the new series points to statistics which it has kept, which show that 70 per cent. of their cars sold in the past eight years have been purchased by persons who previously owned motor cars.

The Westcott series is the result of years of experience and embodies every essential of efficiency and refinement with the elimination of non essentials and complications. Graceful lines and unostentatious appearance characterizes the new line. Added to this is the comfortable riding qualities and roominess. A feature of the Westcott cars is the special upholstery, luxurious and beautiful. The leather used is No. 1, long grain, dull finish leather, tailored to a special design, which eliminates all buttons. Genuine curled hair is used in connection with specially oil tempered springs to insure easy riding qualities and comfort.

Detailed Offerings.

Seven and five-passenger touring cars at \$1690 and \$1590 respectively, seven and five-passenger Westcott Springfield touring sedans at \$2190 and \$2090, a four-passenger touring roadster at \$1590 and a three-passenger cabriolet at \$1890 are the offerings in this special line.



Westcott Six, Series 17, with Five-Passenger Double Cowl Touring Body, \$1590; Seven-Passenger Touring with Disappearing Auxiliary Seats, \$1690.

The body dimensions of this series have been evolved by years of study and experiment. The backs of the front seats are placed 35 inches from the floor board under the dash and in the touring models the seats are separated from each other by an aisle nine inches wide, a practical passage way connecting the front and rear compartments, and by means of which a free circulation of air is permitted throughout the entire length of the car body. From the back of the front seats to the front of the rear seats is a space of 30 inches. In this space are placed the auxiliary seats of the seven-passenger models. These seats disappear completely when not in use.

A genuine pantasote top of special Westcott design adds to the beauty of the car. This top, when not in use, is folded away with the side curtains in a neat dust proof envelope, which covers both the top and the bow supports.

In painting and trimming the car consideration is given to the preservation as well as the beautification of the material. All wood sills, floor boards and frame work are thoroughly saturated with boiled linseed oil; all bodies are carefully primed, filled and rubbed before

the color coats are applied. The painting is done by combined use of air and hand brushes, in order that every part may be reached and the color spread uniformly. The finishing coat of varnish is applied in a dust tight room, which is supplied with washed, dustless, humidified air at a constant temperature. A dark and rich green and a dust proof gray, with trimmings of black and nickel are the standard finishes. Special color combinations may be obtained if desired.

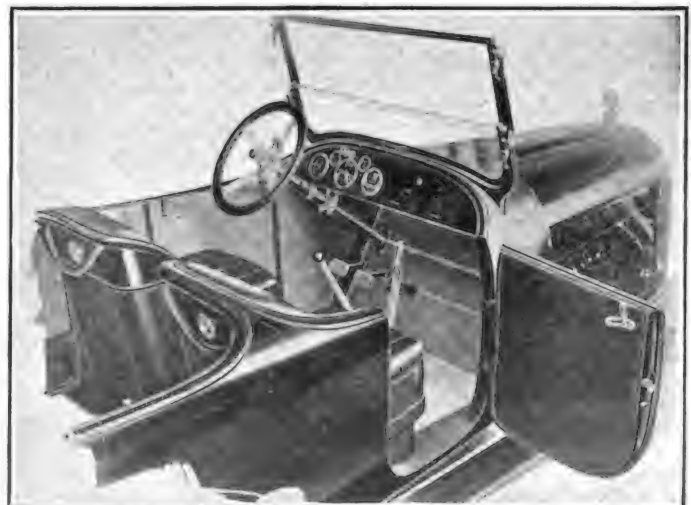
Special Power Plant.

The power plant consists of a six-cylinder block cast engine, having a bore and stroke of $3\frac{1}{2} \times 5\frac{1}{4}$ inches and rated at 29 $\frac{2}{5}$ horsepower S. A. E. rating. The water jacket heads are cast separately and retained by cap screws.

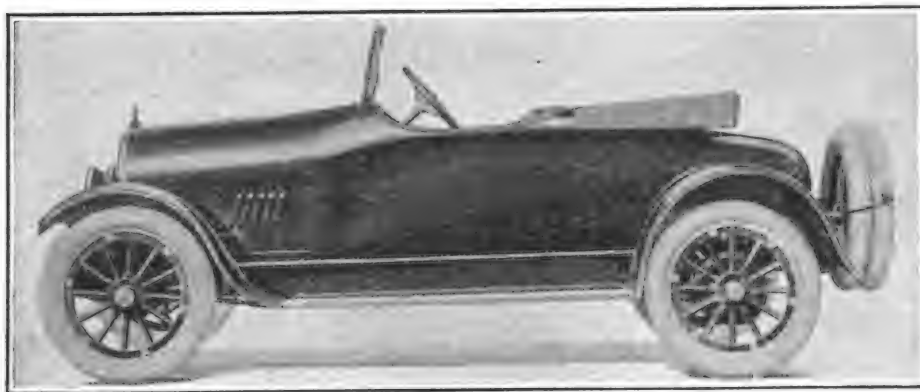
The crank case is made of aluminum and is separate from the oil pan, which is formed of pressed steel. In order to insure a uniform contraction and expansion of pistons and cylinders the same grade of metal is used in both. Each piston is fitted with three concentric expansion rings which are put through a special machining process. Oil grooves are turned on the outside of the pistons



Left Side of Westcott Unit Power Plant, Showing Thermostatic Control of Engine Temperature and Installation of Stewart Vacuum Fuel Feed System.



Driving Compartment, Instrument Board and Controls, Slanting Windshield, Tonneau Lights on Backs of Front Seats, a Pleasing 1917 Innovation.



Beauty in Side Lines of Westcott Four-Passenger Cloverleaf Touring Roadster.

for collecting and distributing the oil uniformly over the inside of the cylinders. Connecting rods are I beam construction, of drop forged and heat treated carbon steel, the caps are held in place by nickel steel bolts, properly secured by a locking device.

Three liberal sized bearings are used for supporting the crankshaft, which is made of a special crankshaft steel, drop forged and heat treated, giving a tensile strength of 90,000 pounds per square inch.

Generous sized, enclosed valves are operated on one side of the engine by a single camshaft, which is drop forged from a single piece of low carbon steel. This shaft runs in white bronze bearings with special oil arrangement.

Cooling System Regulation.

Thermostatic regulation is used on the cooling system. Water is forced by a centrifugal pump through a cellular radiator with removable shell.

Lubrication is furnished by a combination force feed and splash system actuated by a horizontal plunger pump driven from the camshaft by an eccentric. A gauge indicates the level maintained in the crank case and another, located on the dash, indicates the amount of oil circulating through pump system.

A two-unit Delco starting, lighting and ignition system is used, the starting motor operating through a Bendix drive with the flywheel. Ignition is both automatically and manually controlled. The ignition is of the dual type, current sources being from a Willard, 120 ampere-hour storage battery for starting and low speeds, and direct from the generator for ordinary running. The change from one to the other is regulated by engine speed and requires no attention or control on the part of the operator.

Fuel is drawn from a 19-gallon rear gasoline tank by means of the Stewart vacuum system and supplied to the engine by a new type Rayfield carburetor.

A dry plate multiple disc clutch of a new type is contained in the transmission case, which forms a unit plant with the engine. A Westcott transmission of selective, sliding gear type, three speeds forward and one reverse, is used. A notable feature is that the transmission is provided with roller bearings on both ends of the main shaft. All gears are made of nickel steel, ground and hardened.



Cloverleaf Westcott Six Roadster, Showing the Seating Arrangement.

From the transmission the power is carried through two Spicer universal joints with tubular propeller shaft to the rear axle. The drive of the car is transmitted through the rear springs. These are relieved of all torque by means of a double tubular torque arm.

A Timken rear axle is used, with worm bevel gear and Timken bearings. Service brakes are Timken external contracting and Timken internal expanding brakes are used for emergency.

Firestone quick demountable rims on wood wheels are the standard equipment; used, 35x4½ inches on all seven-passenger models, 34x4 inches on all five-passenger models or less.

The Westcott models have semi-elliptic springs in front and springs of a special cantilever design in the rear, made of chrome vanadium steel throughout. The front springs, 37x2 inches, contain six leaves, the rear springs, 50x2½ inches, contain eight leaves. Proper lubrication is insured by pressure grease cups.

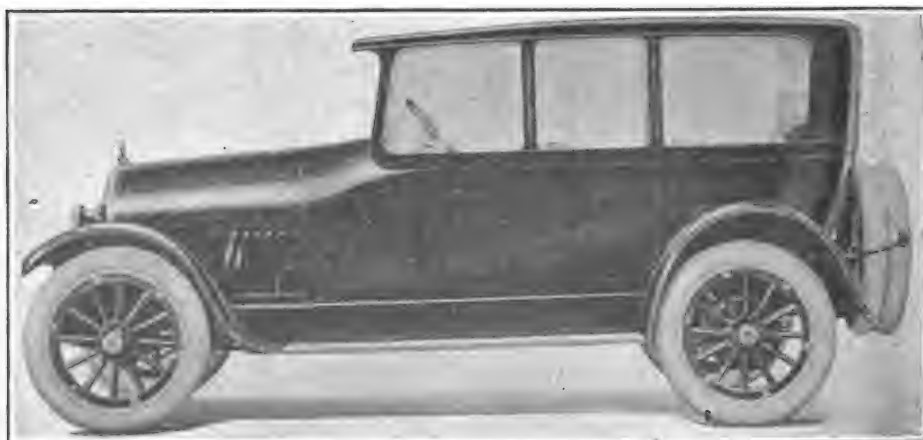
Steering Gear Specifications.

The front axle is of Timken construction with Timken bearings on the wheel spindles. The steering knuckles are of nickel steel and turn on hardened steel bushings.

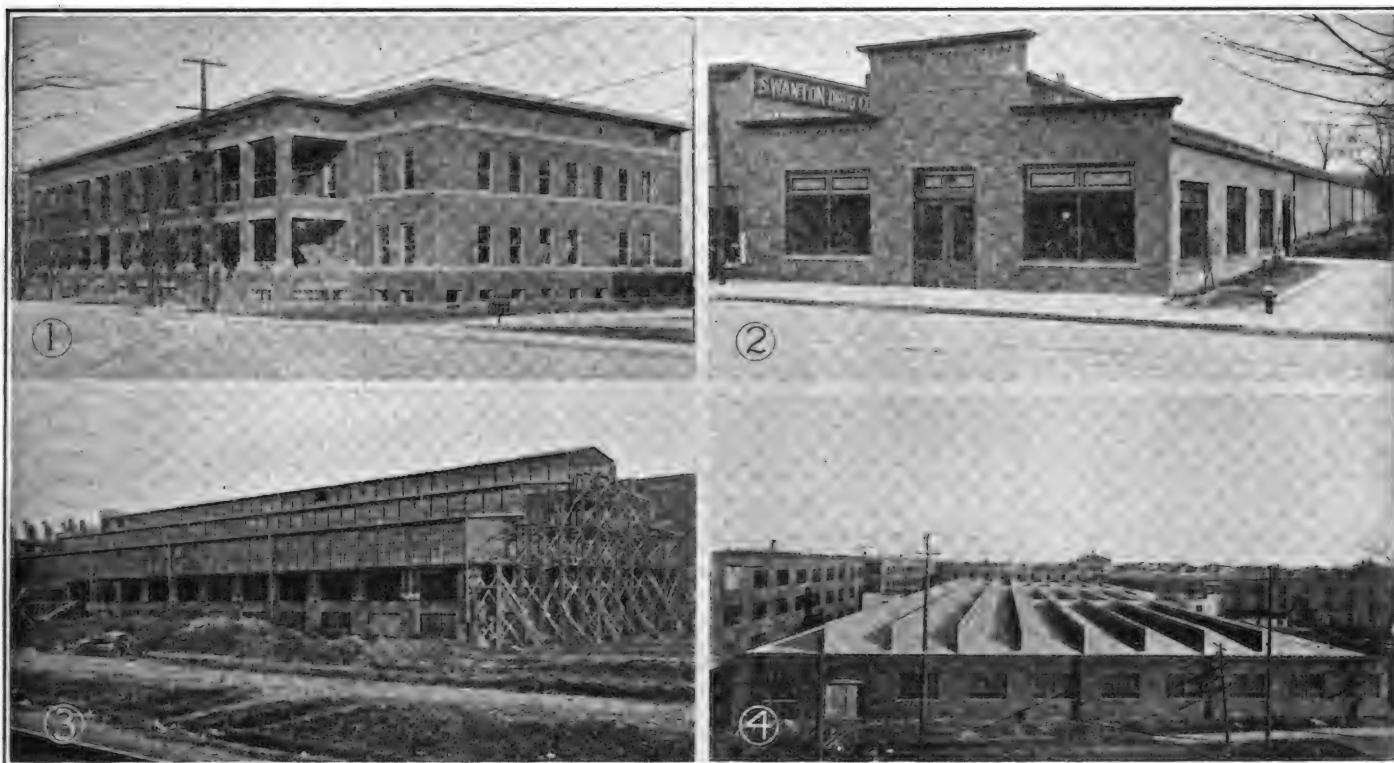
A Gemmer semi-irreversible worm and wheel type steering gear, surmounted by a heavy solid walnut wheel mounted on a die cast aluminum spider, enables the driver to steer the car in comfort and without strain.

The emergency brake and change gear control is mounted in the centre within easy reach of the operator.

A full equipment consisting of a Pantasote one-man top with dust cover and Jiffy curtains, cowl fitting double ventilating rain proof windshield, mahogany instrument board with large compartment for tools, gloves, etc., equipped with Yale lock, ammeter, Shroud lamp, oil pressure gauge, Warner speedometer driven from propeller shaft, extra Firestone demountable rim with tire carrier fastened to rear of frame, Warner electric clock, Klaxon electric horn, Boyce motometer, engine driven tire pump, robe rails, foot rail, license holders, gasoline gauge, complete tool kit and repair outfit and lamps is furnished with each car.



Westcott-Springfield Touring Sedan, Which is Convertible to Open Touring Type.



1—New Reo Club House, Part of Reo Welfare Department.
2—Heat Treating Plant Fitted with Scientific Equipment.

3—Show Room and Garage Connected with Reo Factory.
4—Addition Made in 1916 to Machine Shop at Reo Factories.

The Business Side of the Motor Vehicle Industry

The Reo Motor Car Co., Lansing, Mich., occupies a unique but enviable position in the great automobile industry. While looked upon as one of the most conservative companies, its growth has been marked by steady progress. The Reo company is one of the strongest in the world, financially, and its factories are among the largest, and in equipment, appointments, processes and efficiency, are generally recognized as "the model automobile factories." At the close of last year the Reo factories employed 5308 men as compared with 179, the number on the pay roll in 1905. Thirty dealers handled and disposed of the entire Reo output in 1905, while at present there are over 1700 distributors of the product. In the same period the sales have grown from \$1,250,000 to over \$30,000,000, which figure was attained last year.

An average of 71 car load shipments were sent out of the Reo factories in 1905 every month, while last year an average of 1000 car loads went out every 30 days. The floor acreage of the Reo factories at that time was less than 2½ acres, while now it is up to 50½ acres and the ground acreage is over 40, as compared with three acres in 1905. One walking through all the aisles in the Reo factories would cover a distance of 16 miles.

The Clum Manufacturing Co., Milwaukee, Wis., has perfected arrangements so that it is the sole licensee under Cox patent No. 841,844, 1907, and No. 1,015,300, 1912, covering the manufacture of key operated switches. S. Deutsch has been elected vice president and sales manager of the company, with resident offices at 1831 Dime Bank building, Detroit, Mich.

The Stutz Motor Car Co., Indianapolis, Ind., on March 1 announced an increase in wages to all men working in the factory by the hour. The increase was at the rate of 10 per cent. and the wages of over 350 men are affected, which will call for an additional outlay of over \$30,000 annually.

The Vacuum Oil Co., New York, which owns a number of steamships now oper-

ating in the war zone, has decided to give to the licensed officers of its vessels life insurance for the benefit of their families in case of death by disaster at sea.

R. J. Wilkinson has been appointed sales manager in the northwestern territory for the Jenkins Vulcan Spring Co. and will maintain headquarters in Minneapolis, where a branch will be opened in the spring. W. P. Middleton, who has been in charge of the Fort Worth branch for the Jenkins Vulcan Spring Co., has been transferred to Sumter, S. C., where he will have charge of the company's branch.

The Regal Motor Car Co., Detroit, has



Will H. Brown, New Director of Sales, Elgin Motor Car Corp.

extended its sales organization during the past month through the addition of three new district managers. Fred C. Carter, formerly of the Haynes company, will travel throughout New England states. W. H. Bartleman, who has been connected with the Chalmers company, will take charge of Pennsylvania, and C. P. Townsend, who has been a Winton representative in the South, will have portions of Wisconsin, Illinois and Iowa.

The Flak Rubber Co., Chicopee Falls, Mass., have opened a new branch and service station at 154 W. Rayen Ave., Youngstown, O., under the management of A. J. Sharpe.

The Bosch Magneto Co., New York, has appointed Robert S. Westcott advertising manager of the company to succeed Alfred H. Bartsch, who recently resigned to become a member of the advertising firm of McLain, Hadden, Simpkins Co. of New York and Philadelphia.

Will H. Brown, veteran automobile man and formerly vice president and assistant general manager of the Willys-Overland Co., has been appointed director of sales of the Elgin Motor Car Corp. of Chicago.

Alfred H. Bartsch, for seven years advertising manager of the Bosch Magneto Co., has resigned to become secretary of the firm of McLain, Hadden & Simpkins Co., New York and Philadelphia. In his long association with one of the oldest and strongest manufacturers in the automobile trade, Mr. Bartsch has enjoyed the privilege of being one of the important figures in the development of the automobile, motorcycle and allied industries.

The Detroit Gauge and Metal Stamping Co., Detroit, has been incorporated under the laws of Michigan with a capital of \$50,000, and will assume the entire business of the Retlaw Manufacturing Co., makers of gasoline gauges, 812 Woodbridge St., East, and will continue operations in the present plant with additional equipment and enlarged factory space. The officers of the company are: President, O. S. Kelly; vice president, E. C.

Lewis; secretary and treasurer, Seabourn Livingstone; directors, E. S. Kelly, William Livingstone.

The Hoosier Sub-Carburetor Co., Dunkirk, Ind., has been reorganized and will move to Indianapolis. The capital has been increased from \$10,000 to \$25,000. The directors of the company are: President, E. W. Steinhart, Indianapolis; vice president, George Black; treasurer, C. W. Smalley; secretary, F. H. Hoover; general manager, J. W. Fudge. The company makes the Hoosier sub-carburetor.

The General Motors Corp. has declared a regular quarterly dividend of three per cent. on the common stock, establishing an annual dividend rate of 12 per cent. The dividend is payable May 1 to stockholders of record April 12. A regular quarterly dividend of 1½ per cent. on the preferred stock was also declared, payable May 1 to stock of record April 12.

The increase in the common rate came as a surprise, as the former rate was on a basis of four per cent. annually and there had been no intimation of an increase.

The General Motors Co. of New Jersey, the operating company, has declared a regular quarterly dividend of 15 per cent. on its common stock and a regular semi-annual dividend of 3½ per cent. on its

H. E. Willis, 8 Shaw St., Lebanon, N. H.; Fairmount Electric Service Station, Fairmount, W. Va.; Depot Garage, 30 French St., New Brunswick, N. J.; Buena Vista Garage, 2772 Woodward Ave., Detroit, Mich.; Huffine Motor Co., North 9th St., Frederick, Okla.; The Service Garage, 344 Jefferson Ave., Detroit, Mich.

F. E. Mosher, general manager of the Covert Gear Co., Lockport, N. Y., has appointed A. H. Dittmer to the position of purchasing agent, succeeding E. J. Fritton, who recently resigned. Mr. Dittmer was formerly secretary of production and later comptroller of expense in the Chalmers Motor Co. organization. Prior to that time he was associated with the Packard Motor Car Co. of Detroit and the E. R. Thomas Co. of Buffalo, N. Y.

The Studebaker Corporation, South Bend, Ind., reports net earnings for 1916 of \$8,611,245, or 13.89 per cent. on a total of \$61,988,594. This profit was less than in 1915 owing to the falling off in the foreign business. Last year no war business was taken, although the company completed orders for \$2,791,936, which netted a profit of \$49,392 as compared with a war order business in 1915 of \$13,553,611 on which a profit of \$3,412,112 was made. After preferred dividend requirements

troit Engineering Society, Steel Treating Research Club and Tau Beta Pi, National Honorary Engineering Society.

The Fisk Rubber Co., Chicopee Falls, Mass., made total sales during 1916 of \$19,457,789, on which the profits were \$1,741,704. Deducting dividends of \$448,000 the surplus was \$1,875,442 at the close of the year, as compared with \$1,246,894 at the end of the corresponding period in 1915.

The balance sheet as of Dec. 31, 1916, was as follows:

ASSETS.	
Capital assets.....	\$13,876,308
Investments	404,332
Current assets.....	13,255,634
Deferred charges.....	260,478

Total assets.....\$27,796,753

LIABILITIES.	
Capital stock.....	\$21,900,000
Current liabilities.....	2,874,542
Reserve accounts.....	171,768
For retiring 1st preferred stock	975,000
Surplus for attached statement	1,875,442

Total assets.....\$27,796,753

Byron C. Dowse, formerly president of the Federal Rubber Co., and at one time a large owner in the G. & J. Rubber Co., who has gained the reputation of being one of the most successful tire manufacturers in the country, is organizing the Dowse Rubber Co. of Illinois. No further information regarding his future plans has been given out, but it is reported that they include the organization of a number of large rubber interests in the Middle West.

Howard D. Hutchinson, district sales manager for the Lexington-Howard Co., Lafayette, Ind., while blazing the trail for the overland trip of 100 Lexington cars to Chicago, was fatally injured on Feb. 27 in an automobile accident. The car he was driving was in a rut and when he tried to turn out it turned turtle.

The Kissel Motor Car Co., Hartford, Wis., will start production in the near future on its new 12-cylinder product, which will sell for \$2250 in the touring car model and for \$2650 with the all-year sedan body. The principal features of the new car include a 2½x5 over head valve motor, with force feed oiling, multiple disc clutch, Delco ignition, Stromberg carburetor and full equipment.

The Studebaker Corporation, Detroit, Mich., has advanced the price of the Studebaker four-cylinder roadsters \$55 per car and the price on the six-cylinder roadsters has been increased \$80 per car. The price of the six-cylinder touring cars has been increased \$70.

The Cole Motor Car Co., Indianapolis, Ind., has announced a new price schedule to become effective on April 1, when the price of the touring and Tuxedo roadster models will be \$1795 and the price of the Toursedan and the Tourcoupe \$2395.

L. D. Brown has been elected treasurer of the B. F. Goodrich Co., Akron, O., to succeed W. A. Means, who has been promoted to the vice presidency of the company. Mr. Brown was formerly cashier of the First-Second National Bank of Akron.

The Detroit Battery Co., Detroit, Mich., has increased its capital stock from \$60,000 to \$500,000.

The Fisher Body Corporation, from Aug. 21, 1916, to Nov. 30, 1916, made total sales of \$4,093,491. Expenditures during that period were \$3,407,070, leaving \$686,420 profit. Rentals and interest totaling \$40,080 brought the total net income up to \$726,500. After paying a preferred dividend of \$871,500, a surplus of \$639,000 remained, or \$2.20 per share on 200,000 shares of common stock of no par value. The consolidated income account of the subsidiaries in the period from March 1 to Aug. 31 showed net profits of \$998,806, including net profits of the Fisher Body Co., Fisher Closed Body Co. and Fisher Body Co. of Canada. The company is at present employing approximately 6000 men and has an annual production of 400,000 bodies. The total assets as of Nov. 30, 1916, were \$10,604,717.



Chart Showing Packard Company's Sales Contest.

preferred stock, payable on May 1 to stockholders of record April 12.

Gross sales for the seven months ending in February were \$102,930,659, as against \$86,675,712 for the corresponding period a year ago. The undivided profits for the common stock are respectively \$16,000,984 for the period stated as compared with \$14,991,978 for the seven months ending Feb. 29, 1916.

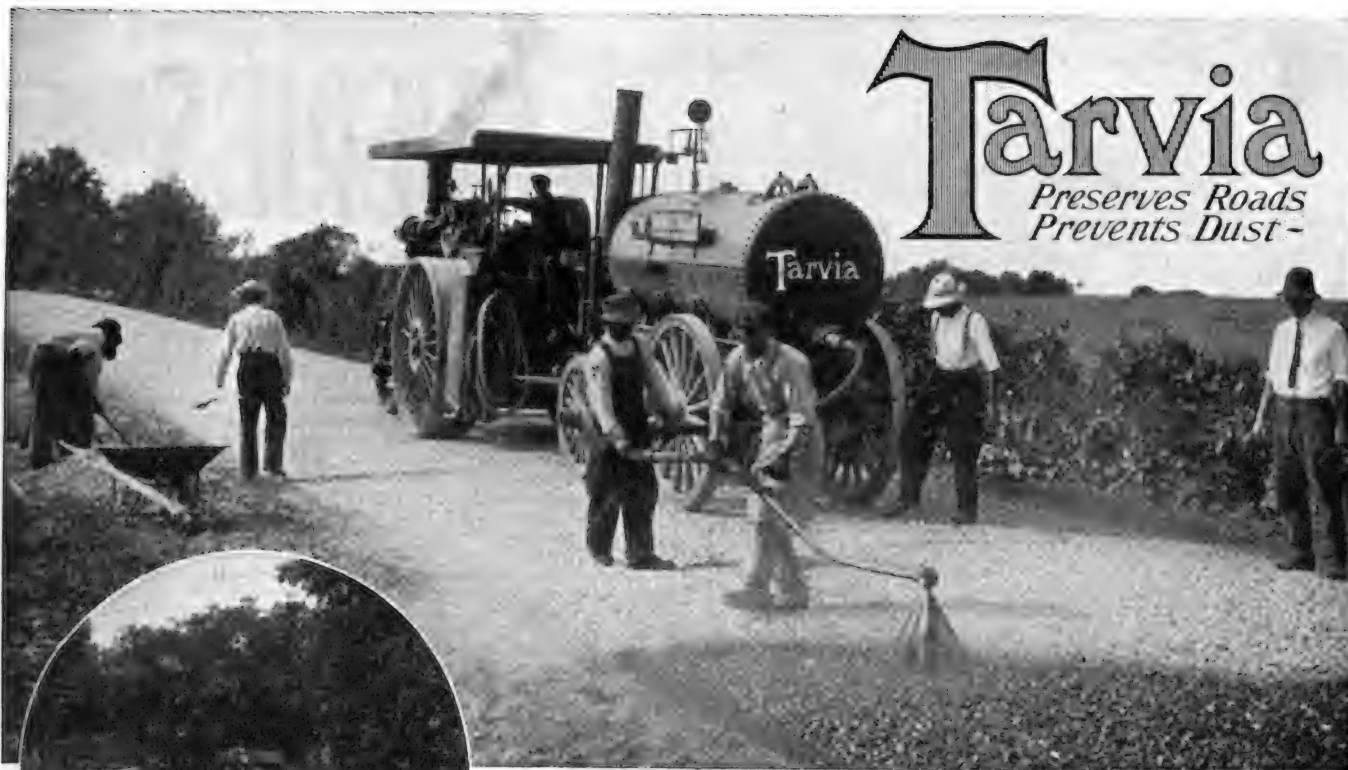
The Prest-O-Lite Co., Inc., has appointed as battery service stations the following individuals and concerns: Verne Fisher, Wayne, Neb.; Tri-City Electric Co., 525 Main St., La Salle, Ill.; Bradley's Dover Garage, 221 Central Ave., Dover, N. H.; Acme Garage Co., Inc., 739 Marin St., Vallejo, Cal.; Warren E. Marshall, N. Bennington, Vt.; Anderson Automobile Co., Inc., 616 W. Okmulgee St., Muskogee, Okla.; Southern Motor Car and Accessory Co., Inc., 208-10 Jackson St., Alexandria, La.; B. B. Bennett, Drake, N. D.; Perry Auto Co., 1217-21 Willis Ave., Perry, Ia.; H. B. Hewitt, Main St., Stafford, Kan.; H. P. Forney, La Crosse, Kan.; The Townsend Auto Co., 41 N. Washington St., Easton, Md.; Bladstrom & Swanson, Rockford, Ill.; Sutton Motor Co., 135-37 Gillespie St., Fayetteville, N. C.; Williams St. Garage, 241-45 Williams St., Decatur, Ill.;

were deducted from last years' earnings there remained 26.14 per cent. for the common stock and a 10 per cent. dividend was declared. The remainder, \$4,843,695 was added to the surplus which is equivalent to 57.40 per cent. of the outstanding common stock.

During the year the company sold 65,885 cars, an increase of 19,000 over 1915. The total assets on Dec. 31, 1916, were \$68,725,549.99, as compared with \$61,496,616.75 on the corresponding date in 1915.

The Packard Motor Car Company, Detroit, Mich., is conducting a sales contest among the Packard dealers and distributors throughout the country. The progress of the race is being recorded in each city on a large map of the Lincoln Highway. Over 800 salesmen and dealers are participating and it has created great enthusiasm.

R. Bissell, for the past three years research engineer of Dodge Brothers Motor Car Co., has taken a similar position with the automobile spring department of the Detroit Steel Products Co. Mr. Bissell is a graduate of the engineering department of the Michigan Agricultural College and is a member of the American Society for Testing Materials, National and Local Societies of the Automobile Engineers. De-



Tarvia
Preserves Roads
Prevents Dust -

The illustration shows "Tarvia-X" being applied under pressure on the wearing-course—at this step the road is about half constructed. The view in the circle is the finished road at Green Lake, Wis. Note that the speeding auto leaves no trail of dust.



Have You a Definite Good Roads Program?

MOST municipal engineers in the large centers have what they call a "Road Program"; that is, the plan for all the streets and roadways within their jurisdiction covering from three to five years or more in the future.

In the smaller cities and towns such a paving program is occasionally prepared by outside consulting experts. They come in and make scientific studies of the traffic on various streets—the grades, the kind of materials that are available, etc.

Then they lay out a complete scheme calculated to keep the road department working for many years ahead toward a well-defined objective of a perfectly paved town.

More frequently, however, no program is followed and roads are built and maintained by rather loose and costly methods. Every town, no matter how small, ought to have a definite road program. Every county ought also to have one. Roads should not be built in a patchwork, haphazard fashion, for the only

result of such a policy is stretches of good roads interspersed with stretches of bad roads.

As a chain is no stronger than its weakest link, so a road is only as passable as its poorest parts.

Therefore, alternating good and bad roads are a costly abomination to all who travel over them and all who pay taxes for their construction and maintenance.

Our Service Department has persuaded many towns to work out a systematic road policy; because we have been able to demonstrate that great sums of money can be saved by so doing.

A system of tarviated macadam—that is to say, macadam that has been bonded with Tarvia to preserve the surface and make it automobile-proof—is an almost indispensable part of every Good Roads Program to-day.

Tarvia roads are not only low in their first cost, but exceedingly low in maintenance cost.

Once a town or city adopts the policy of building Tarvia roads it rarely goes backward, but the mileage is increased from year to year.

The result of such a policy is a town where the roads are dustless and clean, the property values advancing, the road tax low and the taxpayers enthusiastic believers in and boosters of Tarvia.

There are several grades of Tarvia and a dozen methods of using the product.

We should be glad to mail you an illustrated booklet showing Tarvia roads all over the country that are giving the maximum of service and satisfaction at a minimum cost.

Special Service Department

This company has a corps of trained engineers and chemists who have given years of study to modern road problems.

The advice of these men may be had for the asking by anyone interested.

If you will write to the nearest office regarding road problems and conditions in your vicinity, the matter will have prompt attention.

The *Barnett* Company

New York Chicago Philadelphia Boston St. Louis Cleveland Cincinnati Pittsburgh Detroit
Birmingham Kansas City Minneapolis Nashville Salt Lake City Seattle Peoria
THE PATERSON MANUFACTURING COMPANY, Limited: Montreal Toronto Winnipeg Vancouver
St John, N. B. Halifax, N. S. Sydney, N. S.



(When Writing to Advertisers, Please Mention The Automobile Journal.)

Supreme Auto Oil

Flows Freely at Zero. Starts With the Engine.

This is most important during the winter months. You should know whether the oil you are using "flows freely at zero." All oils do not possess this feature—notably the paraffine base oils, which thicken up under cold and often cause great damage to the motor.

The safe way is to ask for SUPREME AUTO OIL—it "Flows Freely at Zero" and leaves less carbon, owing to the fact that it is a Southern Asphalt-base oil containing no paraffine to gum, stick or thicken.

GULF REFINING COMPANY
PITTSBURGH, PA.

The Largest Independent Refining Company in the World.



Highest Quality in Design—Workmanship—Material

Not Theory But Proven Facts

You Have Tried the Rest,
Now Get the Best

NEEDHAM TIRE COMPANY
Charles River, Massachusetts

WHY USE INFERIOR PLUGS WHEN CENTERFIRE

can be bought at the same price? They overcome all Engine troubles, fire where others fail and Add Power to engine. Any length point desired made to order. Try them and you will use them always. Make a trial and save money. \$1.00 each, 6 for \$5.00.

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705-707-709-711 Chestnut St. MILWAUKEE, WIS

(When Writing to Advertisers, Please Mention The Automobile Journal.)



NOTICE TO READERS.

THIS department contains the Mechanical Editor's answers to readers' inquiries. It is open to every subscriber. If any part of your car is not operating satisfactorily, or if you desire information regarding operating, maintaining or repairing motor cars, do not hesitate to lay your troubles before him. He will answer promptly and fully, either by mail or in these columns, as you direct. This service is free to every subscriber, and is often the means of saving considerable money that otherwise would be spent with a garage man. Letters should always be signed with the writer's full name and address, and the car or part in question should be properly identified, by mentioning the maker's name, model, year of production or other distinguishing feature. Address all inquiries to the Mechanical Editor.

GRAY & DAVIS ELECTRICAL SYSTEM. (M. H. A., West Lynn, Mass.)

I have just purchased a Gray & Davis system for my Ford car. Can I use a six-volt, 80 ampere-hour battery with this system? Will you please tell me the correct wiring system to use?

A six-volt, 80 ampere-hour battery should give satisfaction.

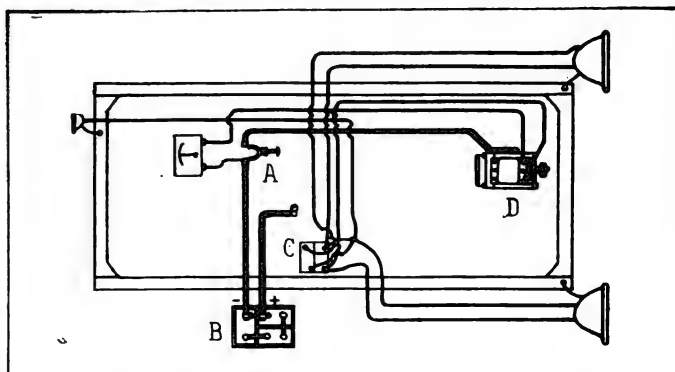
A diagram of the correct wiring of the motor generator, electric wiring for lights, starting button and ammeter, as recommended by Gray & Davis, is given herewith. This applies to the single unit 1916 system.

"A" represents the starting button, "B" the battery, "C" the lighting switch, "D" the motor generator and "E" the ammeter.

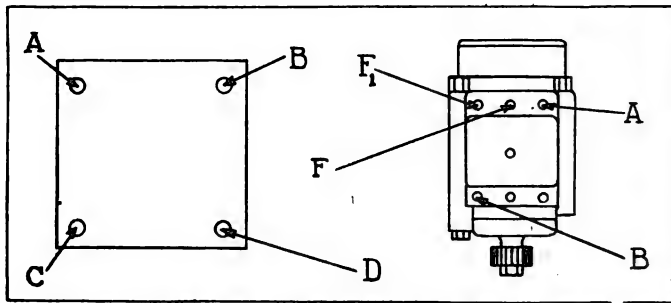
The positive terminal of the battery should be grounded to the transmission bolt. The motor generator is grounded to the frame through its bracket. Head lights and tail light should be grounded through the frame. The wiring diagram shows only the "live" connection for two sets of light bulbs in the head lights, "Bright" and "Dim." The second lead of each light grounds through the frame.

The motor generator cut out, when fastened properly to the top of the motor generator, requires no connecting other than the proper tightening up of the screws fastening it to the motor generator. The binding posts on the terminal block at the back of the regulator cut out are the ones to be connected, as shown in the sketch. The outside posts are connected through the fuse at the front of the regulator. This fuse should be tested and should form good contacts.

To test the motor generator run engine at a speed equivalent to 12 to 15 miles per hour car speed; turn on lights and disconnect negative cable from battery. Then if lamps re-



Wiring Diagram of Gray & Davis Electrical System.



Lighting Switch and Motor Generator of Gray & Davis Electrical System.

main lighted the motor generator is generating, but if they go out, either the motor generator or the regulator cut out is at fault. In this case, keep the engine running with all lamps turned on and battery cable disconnected; connect the regulator cut out terminals A, F, F1 and B (see cut) to each other by a wire, taking care that this wire is firmly held down by all four terminal screws. If this does not cause lamps to light, the motor generator is at fault and should be returned to makers for repair. But if it does cause lamps to light the motor generator is generating and regulator cut out must be at fault, in which case it must be removed from generator and without breaking seals returned to makers for repair.

The lighting switch shown in the cut is connected as follows: "A" is connected with tail light, "B" is connected with motor generator through fuse on motor generator cut out to negative battery terminal, "D" is connected with big lights in head lights and "C" is connected with dim lights in head. The action of the switch is as follows: In "All On" position all four terminals are connected; in "Dim" position "A," "B" and "C" are connected; in "Bright" position "A," "B" and "D" are connected.

TROUBLE WITH DRIVE SHAFT HOUSING.

(A. H., New York, N. Y.)

I have a Chevrolet car, 1915 model. The drive shaft housing seems to be loose at the point where it joins a flange, which is fastened to the cross member back of the transmission. Will you please tell me how to fix it? Is there a roller bearing at this point? How do I go to work to pull down the rear of the car?

The weakness in the housing at the point you mention is caused by the working loose of the rivets which hold the two parts together. We suggest that you confer with an oxy-acetylene welding man in regard to having this part welded. This is advisable, however, if you cannot have the parts welded you must rivet them together again, reaming or redrilling the rivet holes and putting in rivets which fit the holes. (Tight fitting rivets are essential.)

There is a roller bearing at this point and should you find that the wear is excessive it should be replaced either entirely or a new steel sleeve should be provided. We will say more about this replacement later.

We give the following suggestions for removing the rear section. Remove the five bolts which hold the drive shaft housing to the cross member back of the transmission. Disconnect all brake rods, etc., and lift the back of the car up, either by block tackle, suitable jacks or horses, until the weight of the car is removed from the rear axle.

Unfasten the springs from the spring seats and you will find that the rear axle with the drive shaft housing, etc., can be drawn from under the car. The drive shaft housing can then be removed from the rear axle (it is bolted to this member). The hub caps, nuts and wheels may be removed next, the rear axle housing bolts removed and the differential with the drive gear slipped out. No further detailed instruction will be necessary as the disassembling of the differential will be obvious.

Before reassembling the axle you should examine all bearings, bushings and gears. The roller bearings should be replaced if excessive wear is shown. The roller bearing sleeves, if removed, should in all cases be replaced by new. As the sleeves are held in by a projection on the circumference which fits into the housing, their removal means a distortion of the

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Do not confuse SPLITDORF Spark Plugs, "The Plug with the Green Jacket," with porcelain cored plugs. The green porcelain jacket is merely a covering—an outer garment for the ruby mica insulation. This mica is wound lengthwise around the core—in such a manner

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will outlast any engine**

PRICE \$1.00 Each. You can get them wherever motor accessories are sold.

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Is the oldest Automobile magazine published in America devoted wholly to the owners of pleasure cars.

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**TIMES BUILDING
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sleeve, which it is impossible to remedy; the only solution being a new part.

Any part showing excessive wear should be replaced. In most cases such wear brings undue strain upon some other part and consequent damage. Such a replacement is cheaper in the long run.

Remember that it is easier to put the grease into the differential housing while it is disassembled than later on.

In replacing the drive shaft bearing be sure that it seats perfectly. This is essential, as it is necessary to have the thrust bearing absolutely in its proper place before the pinion gear will mesh properly with the drive gear. The same thing applies to the drive shaft housing against the rear axle. The pinion gear should fit into the drive gear the whole length of its teeth.

CORRECTING RATTLE IN STEERING POST.

(A. M. N., Georgetown, Can.)

I have an old model Ford T car. The steering post rattles at the point where it passes into the steering column. I have tried wedges made of iron and wood, but they drop out. Do you know of any way I can stop this rattle? Would it be practical to bore out only one or two cylinders without boring out the other two or three, or would this result in a jerky action of the engine? Is there any way of filling the scratches in the cylinders? Is there a manufacturer making a compound which is introduced into the intake manifold for filling up such scores?

There is no adjustment for taking up the steering post at the point you mention. The rattle at the point you speak of may be caused by the spark rod, the throttle rod, or the steering post. Bend a piece of spring brass or steel into the shape of a letter "S" and put one end around the spark rod, thread it under the steering post, then back over the throttle rod. The tension of the spring should keep the three from rattling.

We would not suggest boring out one or two of the cylinders in the engine without boring out the whole four, as the

(When Writing to Advertisers, Please Mention The Automobile Journal.)

result might be, as you suggest, an uneven running engine. The best plan would be to grind out the scratches and replace the piston rings with rings which you may obtain up to .020 of an inch oversize.

There are a number of manufacturers that claim to repair scored cylinders by a plating method.

We do not know of any compound which may be introduced into the intake manifold to fill up scratches in the cylinders.

HIS CLUTCH STICKS.

(W. B. S., Trenton, N. J.)

I have a 1913 — car. The engine runs all right, but I cannot put the clutch in. The pedal seems to be fixed fast and will not move front or back. I cannot mesh the gears. Can you tell me what the matter is?

From what you have written we should judge that from lack of proper lubrication the sliding sleeve attached to the yoke, which is in turn fastened through linkage to the foot pedal, is "frozen" on to the shaft. Such a condition is serious and requires the aid of a competent repair man. We would suggest that you call upon such a mechanic rather than try to correct the fault yourself.

MORE CLUTCH TROUBLE.

(C. W., East Douglas, Mass.)

I have a Ford car and when the engine is running it has a tendency to move forward. I have had the transmission all to pieces and the clutch discs all work smoothly. The clutch fingers do not press against the discs. Can you give me a suggestion as to where I may find the trouble?

From what you write in your letter we should judge that your trouble is in the high speed clutch assembly. You might verify this by the following experiment:

Jack up both rear wheels and start your engine; try the low speed then try the reverse (with high speed in neutral).

After trying these speeds you will probably find that the high speed clutch does not drag. However, as soon as you throw high speed in again it will be necessary to again apply either low or reverse to disengage the clutch. This proves that your trouble is in the high speed clutch assembly.

In assembling the high speed clutch the thick master clutch plate should be put in first, then alternately a large and small clutch plate until all 26 plates are used. You may find that the thick clutch plate has worn into the brake drum to quite a depth; this would cause the clutch to bind and may be the cause of your trouble. If this is the case it would be advisable to replace the brake drum. It may be possible that the clutch plates are worn or buckled and bind against each other. In this case it would be advisable to replace the clutch discs.

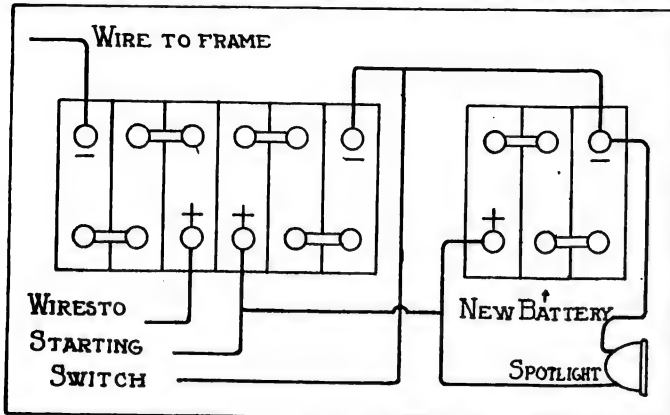
AN AUXILIARY STORAGE BATTERY.

(C. H. V., Chester, Mass.)

I have an extra half battery (three cells) for my Maxwell, Model 25, 1916, car. How can I connect this set of cells so that the generator will keep them charged? How may I connect a spotlight with them? Is a fuse necessary?

The battery on the car consists of 12 cells and is wired up in two sections. It is with these cells that I wish to connect up the three additional cells.

Your extra half, three-cell battery, may be connected with the battery on your own car as shown in our diagram. The diagram also shows the spotlight connection. One terminal of the spotlight is connected with one pole of the battery and



Wiring Diagram Showing Three Extra Cells Connected with Storage Battery.

the other with the opposite pole. Spotlight bulb should be large enough for the six volts furnished. When spotlight is connected in this manner the ammeter will not register current used by it. If it is desired to run spotlight current through ammeter, instead of connecting as shown in sketch, connect one spotlight terminal with the wire leading to either headlight. The other spotlight terminal should be connected with the frame. In this case the spotlight bulb should be of the same voltage capacity as the headlight. No fuse will be necessary.

With the three-cell battery connected, as shown, in parallel with the battery on the car, the generator should keep it charged.

This second set of three cells is entirely unnecessary, however, but as long as you have them and use them as shown, they form a sort of auxiliary storage for the excess current.

SEEKS REMEDY FOR OIL TROUBLE.

(E. L. B., Philadelphia, Penn.)

I have a — car, eight-cylinder, V type engine. The four cylinders on the right of the engine get too much oil. I have drilled holes in the pistons and put a piece of felt under the last ring, but it does not help matters. How can I prevent this excessive oil supply?

In a number of the older V type motors there is a tendency toward excessive oil supply in the right section of cyl-

(When Writing to Advertisers, Please Mention The Automobile Journal.)

If You Have Engine Trouble, Read This

WHEN the ignition system of an engine depends upon a battery, the possibility of trouble is evident—so much else depends on that battery, too.

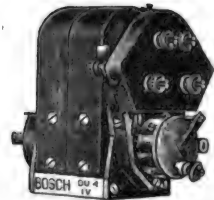
Ignition should be alone, independent of all other units; it should be produced by a good magneto which performs no other function than producing reliable and efficient ignition. When you have magneto ignition, then and only then can you be free of puzzling ignition worries and starting difficulties.

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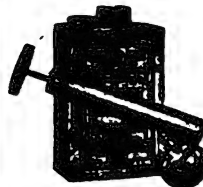
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inders. It is not always possible to overcome this. We give the following suggestions to alleviate this condition. Put in a set of so-called "leak proof" piston rings—we enclose a list of manufacturers of this sort of rings. In the Feb. 25 issue of The Automobile Journal, on page 58, you will find directions for drilling holes in pistons. In your particular case you may find that another set of holes drilled on the opposite side of the lower ring (above ring), slanting toward the top, will help matters. The makers of your car are selling an aluminum piston, properly drilled. In this piston the holes are $\frac{1}{8}$ inch in diameter and about one inch apart on the circumference.

The piece of felt which you have inserted under the last ring should be removed; it undoubtedly acts as an oil absorber and the evil which you are trying to remedy is increased rather than reduced.

MAGNETISM AND PLANETARY TRANSMISSIONS.

(F. H., Carlstadt, N. J.)

Will you please explain magnetism and also planetary transmission?

Magnetism is that property which a piece of iron or steel has which attracts other pieces of iron or steel to it. Just why a piece of iron or steel does possess this property is not known. There seems to be no material change in the iron or steel itself. A piece of magnetized steel has practically no more physical properties outside of magnetic attraction than a similar piece of unmagnetized steel. A piece of steel loses its magnetic properties when heated to a red heat and unless subjected to magnetic lines of force from an outside source does not regain its magnetism when cooled.

For our discussion let us divide the magnets into two classes, permanent and electro-magnets.

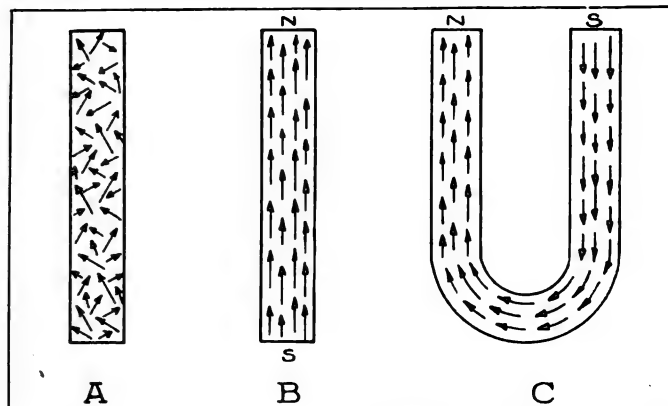
Permanent magnets are found as natural magnets in the form of lodestone. The commercial, artificial, permanent magnet is made of hard steel for the reason that steel will hold magnetism longer than iron. In general the harder the iron or steel the longer it will hold its magnetic properties.

Electro-magnets are formed of a core of soft iron, around which is wound a coil of wire, when an electrical current is passed through the wire magnetism is induced in the core. As soon as the current ceases the core loses all, or a greater part of its magnetic property.

In both of the classes, there is a limit to the amount of magnetism which the piece of iron or steel will hold. When the magnet has reached this point it is said to be saturated. As an illustration of this let us look at "A." The particles of which this bar of magnetized steel is composed have a polarity and all point in a general direction, therefore, a certain amount of magnetism is given to the bar itself. As the particles gradually turn in the same direction as shown at "B" the bar becomes saturated. It will be impossible to induce any more magnetism in it.

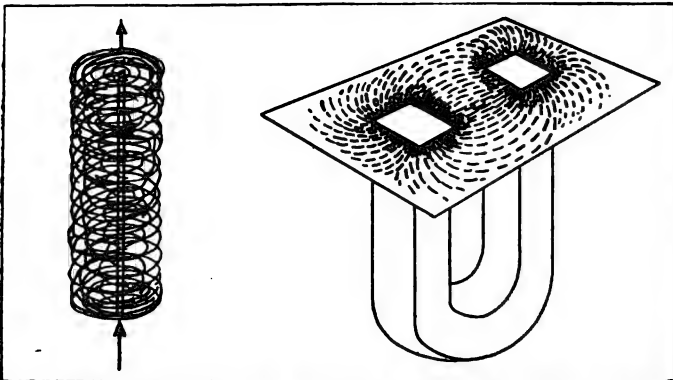
In order to utilize the attraction of both poles of the magnet it is often bent into the shape C. Cuts B and C illustrate the more commonly used types of magnets, bar and horseshoe, though magnets may be made in many shapes.

Magnetism acts in lines which are termed lines of force. These lines cannot be seen, but it is possible to make their effect evident. Place a piece of flat glass, cardboard or thin



Illustrating Forms of Magnets.

(When Writing to Advertisers, Please Mention The Automobile Journal.)



Showing Lines of Force Around a Wire and from a Horseshoe Magnet.

brass upon the poles of a horseshoe magnet, sprinkle upon it some fine iron filings. Our cut shows in a general way just what the result is. The iron filings seem to form into lines which follow the lines of force from the poles of the magnet.

The relation between the flow of electric current and magnetism has never been clearly defined. An electric current flowing through a wire produces lines of force as shown in the cut. These lines act in circles around the wire.

The operation of practically all kinds of electrical machinery is based upon magnetism. A planetary transmission is so called from its resemblance in action to our planetary system, that is, the movement of the earth, moon and stars around the sun.

Planetary transmission may be of a number of types, but the generally used one is the spur gear type, which we will describe here. The operation of other types is similar.

The power end (engine end) consists of a rotating member such as a flywheel upon which are mounted three studs, in triangular arrangement, equidistant from the centre. Upon these studs are three triple gears. Each triple gear is made up of three gears fastened together, generally of different sizes, in order to obtain different gear ratios.

Meshing with these gears at the centre are three more gears, the first or driven gear is fastened to a cone around which a band may be compressed or released. This cone is fastened to the drive shaft, which operates through the rear axle. The second and third gears are each fastened to a similar drum provided with bands as above.

Now to illustrate the action of this transmission. On high speed the power is transmitted through the transmission shaft. A suitable clutch in the brake cone connects it with the transmission shaft and the whole transmission assembly is revolved at engine speed.

Pressing the low speed band around the low speed drum prevents that cone from turning and holds the slow speed gear stationary. This causes the triple gears to rotate on their shafts. The rotation of these gears transmits the power through them to the driven gear and thence to the rear at a low speed.

Pressing the reverse speed band around the reverse speed drum prevents that cone from turning and holds the reverse gear stationary. This causes the triple gears to rotate on their shafts. The rotation of these gears transmits the power in a reverse direction to that of the low speed gear through them to the driven gear and thence to the rear axle.

REMARKS ON COOLING SYSTEMS.

(L. E. M., Sandusky, O.)

Will you please give me any information on the proper temperatures for the cooling liquid in circulating systems of automobile engines? In other words, how warm should the water be to get the best results, and at what temperature does it begin to get too hot?

We gave a long explanation of the cooling of the cylinders of an automobile engine in our Jan. 10 number of The Automobile Journal (page 42), a clipping of which is enclosed.

To quote from this: "Were cooling liquid in the radiating system of any internal combustion engine kept constantly at the most efficient temperature, this would be within or slight-

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ly less than the boiling point—212 degrees Fahrenheit."

In both the Packard car and Cadillac car the cooling system is thermostatically controlled. The cooling liquid is allowed to circulate through the cylinders only until it reaches about 180 degrees. At this point the water is circulated through the radiator.

To enlarge and continue upon our discussion which we published in the Jan. 10 number, we will add the following:

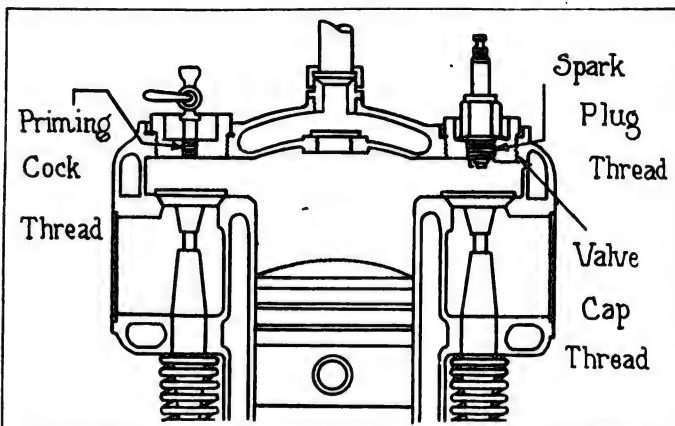
Engine builders endeavor to accomplish two results—maintain the temperature of the motor as high as possible and not affect lubricity and dissipate the water from the cooling system, and draw fuel into the cylinders as cool as this can be practically done to lower the temperature of the valves and obtain the greatest degree of expansion in the combustion chamber.

From this statement it is safe to state that the cooler is not intended to keep the circulating water at as low a temperature as possible, but to reduce the temperature to a point slightly less than boiling when the engine is driven to approximately its maximum capacity. To accomplish this coolers are made in the form of what are termed radiators, because they expose large surface areas to the air and radiate the heat from the water. The radiation is promoted by creating a very rapid circulation of air through the coolers, either by fans or by the movement of the vehicle.

COMPRESSION LEAKS.

(H. L., Boston, Mass.)

Some time ago you published in your magazine a cut of a T head engine which showed the points where compression might be lost. Will you please give me such a diagram if pos-



Illustrating Probable Points of Leakage in Compression.

sible? Will you please tell me about loss of compression and its effect on the engine?

We reproduce herewith such a diagram as you write us about. The illustration clearly shows a number of the points at which the compression might leak through. In addition to the points indicated on the sketch it may be found that a certain amount leaks by the pistons and valves.

It may be found that the cylinder walls are scored lengthwise, thus permitting a certain amount of compression to leak through these scratches. Such scores should either be ground out or filled in by a welding or plating method.

After a time it is found that the valves do not seat properly, the action of the intake, explosion and exhaust wears the surfaces sometimes, causing pits and grooves, which allow the gas and compression to leak by them. In this case grinding of the valves is resorted to to correct the condition.

To test the compression of a suspected cylinder, open the petcocks, remove the spark plugs of all the cylinders except the one under suspicion. Then turn the motor over by hand until resistance is felt. If no resistance is encountered, it is positive proof that all the gas is leaking out. If, however, a resistance is felt, the crank should be held stationary against the same while the operator listens for a hissing noise, which will come from the point where the compression is escaping. Leaks, such as are indicated in the illustration, may be located by squirting kerosene around the joints. If bubbles appear there is a leak at this point.

One more common cause of loss of compression is that which arises from an improperly adjusted valve or push rod. When the valves are closed there should be a space between the valve stem and the valve lifter or tappet of about 1/64 of an inch, but not greater than 1/32 of an inch.

FORD TRANSMISSION ASSEMBLY.

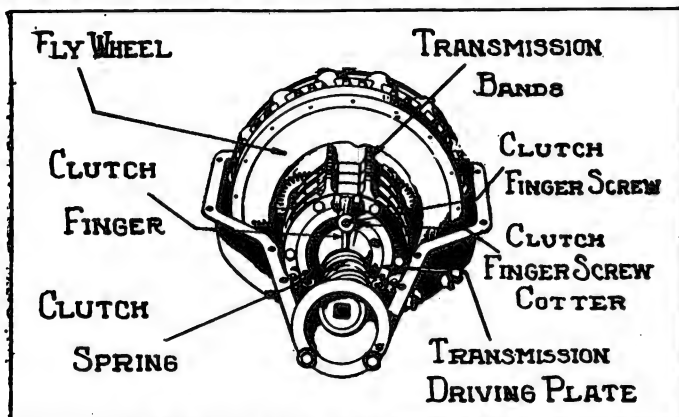
(A. L. S., Providence, R. I.)

Will you please tell me how to adjust the transmission bands and also the high speed clutch on a Ford T car?

We illustrate herewith the Ford car clutch assembly, showing the transmission bands, and the adjustment for the high speed clutch.

It will be possible for you to adjust all of the clutches and brake band by removing the cover on the transmission case. You will notice that there are two projections on the brake bands, one on each end, the arrow on the sketch marked "Transmission Bands" points to the lugs in question. These projections are connected by bolts. The nuts on these bolts should be screwed up until it is possible to contract the bands sufficiently by pressure on the foot pedals so that the cones cannot turn. At the same time, however, it is essential that the nuts are not screwed so tightly as to cause a drag when the pedals are released. It frequently happens that the lining of the bands is so worn as to make this adjustment impossible. In such a case the only remedy is to remove the bands and reline them.

The high speed clutch is adjusted by tension upon the screws indicated in the cut by the caption "Clutch Finger



Illustrating Ford Transmission Assembly.

Screw." These screws are held by lock nuts and three in number. In making this adjustment care should be used to turn up on all three screws an equal amount. When the adjustment is reached the lock nuts should be tightened into place. These screws should not be returned so tightly as to cause a drag when the high speed pedal is at neutral. It sometimes happens that the clutch finger screw cannot be screwed in deep enough so that the adjustment may be made. In this case the only practical remedy is to add two more clutch discs. This means that the whole transmission be disassembled.

In every case the clutches or bands should not be adjusted so tightly as to drag upon the transmission when the pedals are in the "Off" position. This may be ascertained by jacking up one of the rear wheels and turning the engine over by hand. Should the rear wheel turn it is an indication that there is a drag in the transmission.

HORSEPOWER FORMULAE.

(A. J., New York, N. Y.)

Will you please tell me the formula for horsepower, by the S. A. E. rating? Why is this rating different from the manufacturers' horsepower?

The S. A. E. or N. A. C. C. formula as it is called is $D^2 \times N$

— = H. P. In other words, the square of the diameter of 2.5.

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ELCAR

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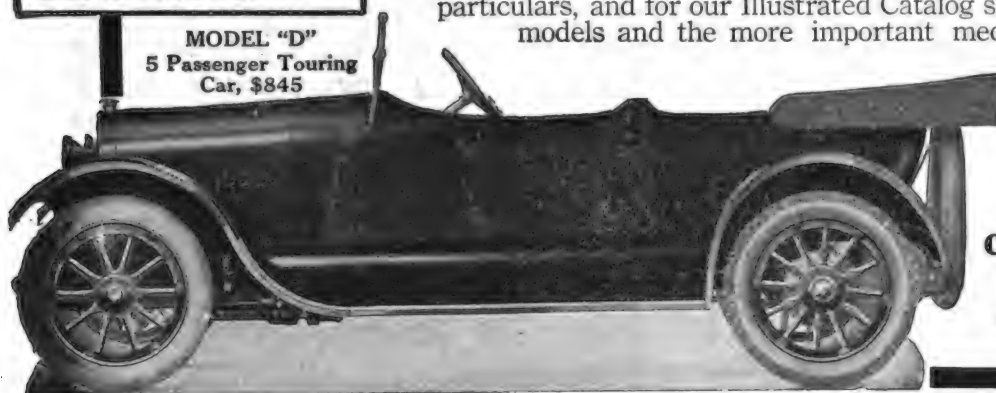
The Elcar at \$845

Does Its Own Talking

A Few Elcar Specifications

Wheel Base—As long as some cars selling up to \$3,000 and more—115 in.
Motor—4-cylinder; long stroke; high speed; 34.7 h. p. at 1,800 r. p. m.
Fuel Supply—Stewart vacuum system.
Ignition—Delco automatic spark advance with manual control.
Starting and Lighting—Dyneto two-unit; double-bulb headlights; Willard storage battery.
Clutch—Dry multiple disk—seven plates, steel on Raybestos.
Rear Axle—Full-floating with roller bearings at each end of wheel hubs.
Differential—Spiral bevel driving gears, with roller main bearings and ball thrust bearings.
Brakes—Internal and external, two inches wide on 12-inch drums.

MODEL "D"
5 Passenger Touring
Car, \$845



Looks better than its price, and is just as good as it looks. A car of distinctive beauty, well designed, well built, well finished—a car in which quality speaks right out.

Three Models at One Price

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Two Passenger Roadster

Secure it for your territory

We want to place our proposition before live dealers in territory not already assigned. Write us for particulars, and for our Illustrated Catalog showing all ELCAR models and the more important mechanical parts, and describing the construction of the ELCAR even down to its small details.

Elkhart
Carriage & Motor
Car Company

6811 Beardsley Avenue
 Elkhart, Indiana

the cylinders multiplied by the number of cylinders and divided by the constant 2.5 equals the horsepower.

This formula is the result of an endeavor to standardize the horsepower ratings of various engines and is based on the average view of eminent engineers as to a fair, conservative rating for a four-cycle engine at 1000 feet per minute piston speed.

You may find that some manufacturers base their horsepower rating upon a higher engine speed. For instance, a manufacturer may claim that his engine furnishes 40 horsepower at 2000 revolutions per minute, while by the S. A. E. formula the same engine rates at 20 horsepower.

At the same time the claim of the manufacturer for 40 horsepower is entirely fair, as the particular engine which he makes furnishes its maximum power at his rated speed, namely, 2000 revolutions per minute.

FIRING ORDER.

(F. J. M., Philadelphia, Penn.)

Will you please give me the firing order of the Chalmers 24 car? Also the correct magneto setting? Why is it necessary to have the cylinders fire in a special order?

The firing order of the Chalmers 24 car is 1-4-2-6-3-5. As the camshaft is designed to open and close inlet and exhaust valves in a certain sequence, which complies with above firing order, it will be necessary to connect secondary wires as indicated above.

To set the magneto turn the engine over until the piston has traveled $1\frac{1}{2}$ inches past centre on the down stroke of the explosion in cylinder No. 1. Set the spark lever fully retard and mesh the magneto gears at such a point that the breaker points in the magneto are just breaking. The engine should then fire $1\frac{1}{2}$ inches past centre. Distributor wires should be connected with plugs in the order above named.

(When Writing to Advertisers, Please Mention The Automobile Journal.)

HIGH AND LOW TENSION MAGNETOS.

(E. B., Providence, R. I.)

Will you please tell me the difference between high and low tension magnetos as applied to ignition? Is the Ford car magneto a high or low tension magneto?

Low tension magnetos as applied to automobiles at present are usually below 20 volts. The Ford magneto may be considered as low tension. Current from such magnetos must be "stepped up" by means of a coil to make it suitable for ignition purposes. The current required for leaping the spark gap in the spark plugs runs considerably over thousands of volts, and the usual method of increasing voltage, which is furnished by the low tension magneto, is by the coil transformer method. This consists of a winding of comparatively coarse wire around a soft iron core. The ends of this coil are connected with the source of current supply, through a suitable vibrator and switch. Surrounding this coil is a larger coil, made up of a great number of turns of very fine wire, the ends of which are connected with the spark plug centre and ground respectively. When the low tension current passes through the heavy wire a current is induced in the fine wire of very high voltage, and this current leaps the spark plug gap. Of course it is necessary to apply mechanical means for distributing such current to the proper cylinders, such as timers or distributors. The essential parts to such a system are magneto, coil, vibrator or interrupter and timer or distributor.

High tension magnetos are so designed in most cases as to include the essentials of a low tension system. A high tension magneto contains within itself the necessary windings for generating the current, for stepping it up to the voltage required for the spark plugs and for distributing it to the proper cylinders at the right time. A complete ignition system in a single unit.

Said Mr. Ryder —

ACTUAL
EXPERIENCE
No. 1.

I Like the **Hartford** SHOCK ABSORBER



because I'm the fellow who pays the bills. Since I equipped I get more mileage out of my tires; the car hasn't been in the repair shop once; a gallon of gasoline carries it farther, and—what counts most with me,—my family is getting a world of comfort out of it and we've ridden everywhere within a radius of a thousand or more miles over all kinds of roads."

Makes
Every Road a
Boulevard



The difference between comfort and discomfort, is a set of Hartford Shock Absorbers. More than 400,000 users will subscribe to this fact. As much a necessity as rough roads are actualities.

Used as factory equipment on many cars famed for their superior riding qualities.

"Between You and Jolt, Jar and Vibration" is a booklet of intense interest to every car owner. Sent on request.

EDWARD V. HARTFORD, Inc.

Heretofore known as
Hartford Suspension Co., 147 Morgan St., Jersey City, N. J.

Makers of the Hartford Shock Absorber, E. V. Hartford Electric Brake, Hartford Auto Jack, Hartford Bump Absorber

Branches: New York, 1846 Broadway, and
Service Station, 1926 Broadway; Boston,
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Michigan Avenue.

Distributors in principal cities.
Dealers everywhere.



For Safety's Sake
Hartford
BUMP ABSORBER
— more than a bumper

For Ease and Efficiency
Hartford
AUTO JACK



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INDEX TO ADVERTISERS



EAGLEINE OILS

are unequalled for motor lubrication, freer from carbon, economical because they protect the motor against mechanical wear, and the quantity required is comparatively small.

These are the claims of thousands of motorists,—some with years of experience, who want full value, and more who know the value of high grade lubricants, and who know when they obtain satisfaction.

EAGLEINE QUALITY IS INSURED TO YOU

A grade for every type of motor. It is sold in sealed containers.

*Let us send you our new book and chart.
It is free at request.*

EAGLE OIL AND SUPPLY CO.

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NEW YORK CITY
Woolworth Building

CHICAGO
1132 W. 37th Street

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Jackson

"No hill too steep—
No sand too deep"

There is a big demand for the "Wolverine Eight." See it and you will understand why. A Genuine Family Car

The more you know about eights and the more you know about motor cars in general the quicker you will be to appreciate the points that are making the "Wolverine Eight" the most popular and quick-selling car ever built by the Jackson Automobile Company.

We invite your attention to two important factors in this success—the Ferro-Jackson motor, and the pleasing variety of beautifully finished, well-built bodies offered in connection with the Wolverine eight chassis.

The Ferro-Jackson motor is creating an amazing interest in the Jackson car. It is the first American-designed, V-type, eight-cylinder motor with enclosed overhead valves without cages.

It is the first eight as well as the first V-type motor to be cast with both cylinders and upper half of crankcase in one piece.

With a bore of 3 inches and a $3\frac{1}{2}$ inch stroke it develops more power per cubic inch of piston displacement than any motor ever built up to the present time. It is rated at 28 h. p. and shows in ex-

cess of 50 horsepower on block test at 2800 revolutions per minute.

It is economical to a surprising degree—shows an average of 17.7 miles to the gallon of gasoline on touring tests. Some owners report better than that.

And it is an exponent of the finest type of motor smoothness, flexibility, quick acceleration. It shows surprising freedom from vibration at all speeds.

You will find the body styles up to the minute. You must see them to really appreciate their extra quality.

Five-Passenger Touring Car, \$1295. Four-Passenger Cruiser, including five wire wheels, \$1395. Wood wheels \$100 less. Two-Passenger Roadster, \$1295. Five-Passenger Sedan (Demountable Top), including regular top, \$1505. Seven-Passenger Jackson-Springfield Sedan, 1995. All prices f. o. b. factory.

Dealers: The fifteen-year-old reputation of the Jackson Automobile Company for producing cars of strength, power, comfort and ease of riding is more than lived up to in this new model. Write and learn more of the sales opportunities offered you in the agency for this car.

Jackson Automobile Company

1229 East Main Street, Jackson, Mich.



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UNIVERSAL TRUCK ACCOUNTING SYSTEM

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It affords every detail of time and work of any number of machines, the labor, operating cost, revenue and earnings, with comparisons for any period, in one record book and day card for each truck.

The simplest and most comprehensive record ever conceived, adaptable for use with any method of house bookkeeping or independently, that can be made to serve as part of any method of accountancy.

The most intensely practical system of accounting ever devised, that can be maintained by a girl clerk and which has no limitations.

When you know the exact cost of truck operation and what is earned through the use of any vehicle, you have data of the greatest practical value.

Detailed information at request. When writing state number of trucks in use.

The Motor Truck

TIMES BUILDING

PAWTUCKET, R. I.

MOTOR TRUCK

Construction

Operation

Maintenance

Repair

Care

PRICE ONE DOLLAR

A work that is complete, wholly practical and deals with all subjects as the title implies.

Truck Care
Truck Repair
Truck Operation
Truck Maintenance
Truck Construction

Prepared for
Owners
Operators
Repairmen
Salesmen

\$1.00 the copy. In combination with a yearly subscription to **Motor Truck** (the great national authority on highway transportation, issued monthly) **\$2.00**.

This is the only book published dealing with business wagons, it is fully illustrated and represents a wonderful value.

THE MOTOR TRUCK
Times Building Pawtucket, R. I.

The Unanimous Choice of 73 Leading Manufacturers!

This test was an exhaustive one and open to all makers of Spark Plugs. AC won over all.

Look for the
AC burnt into
the porcelain.



They deliver the vital spark whether the car is traveling 1 mile or 100 miles per hour.

AC Spark Plugs are Regular Equipment on all the high class cars and trucks shown in the list printed in white on the big AC.



The Standard Spark Plug of America

The master mechanics of these cars have experimented for you. They know. Follow their lead if your car is not AC equipped.

Champion Ignition Co.

Sole Manufacturers
Flint, Michigan, U. S. A.



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Canada, \$2.50 a year.
Foreign Countries in Postal Union, \$3.50 a year.

AUTOMOBILE JOURNAL

Remittances:

Should be made by Check, Draft, Postoffice or Express Money Order, or Registered Letter. Money enclosures must be at sender's risk.

Entered as second class matter, April 15, 1906, at the Postoffice at Pawtucket, R. I., under act of Congress of March 3, 1879.

Ten Cents
a Copy

IN THE way of service the average motorist gets more and more out of his car with each new day of his ownership of it. The possibilities of the car for pleasure are by no means the limit of its usefulness. Some estimate of the expansive value of the automobile to the average owner is given in the leading article of this number. The subject is far from exhausted. In fact, it is only casually opened for the consideration of the owner who looks further than mere mileage as the measure of the value to him of his equipment. Popular treatment of the theme insures that it will be readily understood.

WITH a war cloud ahead there may be some deferment of plans for the motoring season in ordinary. Vehicular equipment of all sorts is of course held in readiness for the use of the government, making a phase of enlistment for service such as this country has never seen before. In the first days of mobilization, under the call of the President, large fleets of motor pleasure cars and trucks were made available for getting men and supplies to the armories as the month drew to a close.

MORE good roads everywhere in the country have their attraction to motorists. In the official journal of the National Automobile Association, attention is called to the value of starting out to see America right by seeing New England first. With the military and naval activities going on, there will certainly be much to attract this summer in the ports of New England. Bar Harbor, Newport, Watch Hill and New London promise to be lodestones of attraction in this respect. There are a number of valuable new points regarding law for motorists, likewise information about traps, also to be found in the Association Journal section.

VOL. XLIII. MARCH 25, 1917.

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Treasurer . . WILLIAM H. BLACK

Secretary D. O. BLACK, JR.

Published the 10th and 25th of each month by the

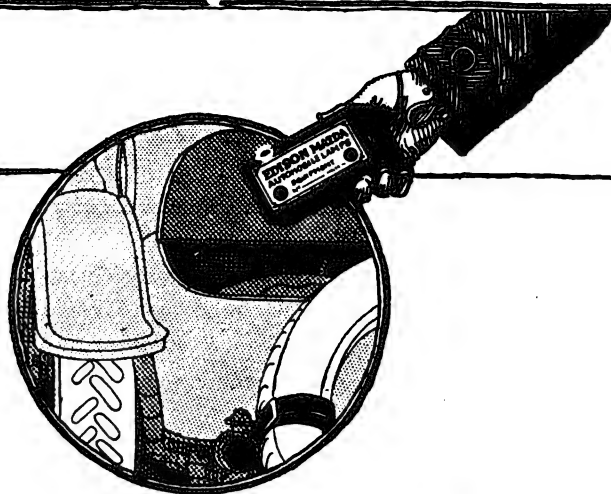
AUTOMOBILE JOURNAL PUB. CO.

Times Building, Pawtucket, R. I.

HOW many times has the average motorist been at a loss on how to examine out of the way places in the mechanism of his car? If he wants to know whether the wristpin is loose, inspect back of radiator or gears, it is something of a problem. How to do it by providing one's self with a simple device is told amongst the practical suggestions. This is not the only good thing to be found on those pages. There are many others.

MOUNTING gasoline prices and actual shortage of petrol disturb the British motorist far more than they do the American car owner. The war has made an immense change in conditions. Many of these are on the human side of service. Since something of the kind seems to be coming in this country, the woes of motordom in the United Kingdom are of no little interest. Some were lucky enough early in the war to have their cars commandeered by the government, in which case they were at least saved a long series of progressive sorrows by getting rid of their grief in one stroke. If one finds himself still possessed of his car he has to pay 74 cents a gallon for gasoline, the quality of which is not always above suspicion. Besides, he probably has to drive his own car, for mechanics to take care of motor cars are the particular class the government has needed.

UNCERTAINTIES as to just what the government will call on the United States motor world to do has many marking time with their plans for the season. Racers are to be air men, possibly. The plants of the industry will doubtless make war equipment, aeroplanes and armored cars. All depends now on the expected declaration of war with Germany, when Congress meets on April 2.



You carry an extra Tire, Why not extra Lamps?

Ask your customer that question—"Why not extra Lamps"—and your profit on a complete set of spare lamps is pretty well assured.

He carries spare tires as a matter of course; he carries an extra spark plug and other spare parts to provide against any number of possible emergencies.

But what about his lamps?—Why not extras?

It's just simple logic—and good judgment—for him to carry a complete spare set of

EDISON MAZDA Automobile Lamps

To make your sale of *Edison Mazdas* easy and certain we supply you three mighty valuable and effective helps:—

First—Our new indexed booklet, from which even an inexperienced clerk can tell at a glance the correct bulbs for any socket in any car—no matter what make or model.

Second—Our special EDISON MAZDA Auto Lamp chests, in which you pack the proper bulbs. Customers like this handy, compact chest because it's convenient, and the lamps can't break. He can just chuck

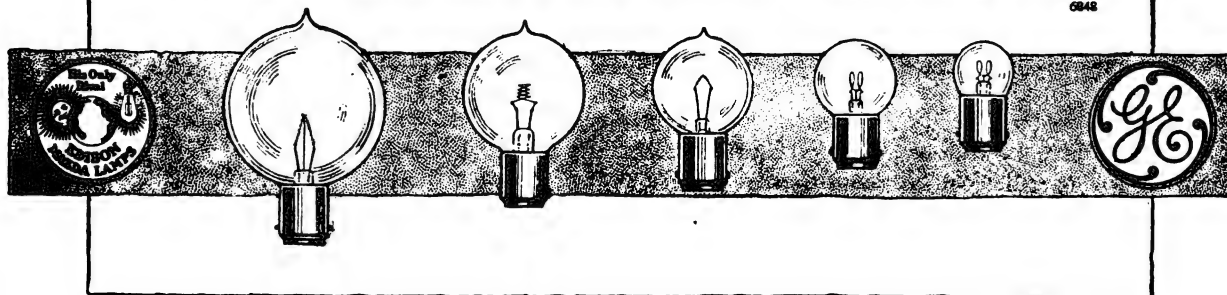
it into his tool box and forget the lamps till he wants them.

Third—Our complete counter assortment which displays attractively, and contains the correct lamps for every socket and practically every car made. The initial investment in this splendid sales-aid is slight—and our scheme for the re-ordering to keep the stock complete is almost automatic.

Write us today for our unusually attractive—profitable dealer proposition.

Be the first in your district *this Spring*.

EDISON LAMP WORKS, of General Electric Company, HARRISON, N. J.



GETTING FOREIGN BUSINESS

THERE are today a large number of American manufacturers of motor vehicles who are doing a most satisfactory business in foreign countries. Even as conditions are today, these keen, far-sighted, opportunity grasping, progressive concerns are rapidly perfecting selling channels which will permit them to dispose of a very considerable part of their output.

American products are already established in all foreign countries as standard goods, the best that can be produced. Thousands of foreign trade distributors are specializing in lines that are produced in this country. These are concerns that are well established. They are in a position to transact a large volume of business. This means certainly and distinctly that they can afford service to the buyers in their home field which will compare favorably with the service which domestic distributors supply to their patrons in this country.

Generally speaking, such connections in a foreign country are cash buyers, and, as they are now looking to America as the logical country to supply their needs, it is the opportune time for the producers in this country to explore foreign fields and reach all of the dealers who are in a position to place orders.

TRADE POSSIBILITIES UNLIMITED

The market of the world will soon be open to American manufacturers. It is waiting for American products. It is waiting for American service. There should not be an instant of hesitation. There is nothing mysterious in the act or details of entering into foreign business. The opportunities are unlimited. It is certainly the foresighted manufacturer who is now busily engaged in establishing his lines in the foreign field. Most emphatically he is establishing them on a permanent basis, almost as soon as he has made a beginning.

The way to enter foreign trade is simple. Not as an auxiliary, but as a direct channel, the Foreign Trade Bureau of the Automobile Journal opens the markets of the world to manufacturers. This bureau now enjoys a large membership, including concerns that produce vehicles, parts and equipment. Those who are affiliated with the Automobile Journal Foreign Trade Bureau are in direct touch with more than 8000 foreign dealers, in more than 85 foreign countries. Membership in this bureau is free to advertisers in the Automobile Journal. The great advantage afforded is that all members operate their own foreign departments, yet at practically no additional overhead.

REACH ALL BIG TRADE INTERESTS

The concerns and individuals reached by the members in this bureau are the leading distributors in their respective countries. Most of them are what we would term importing jobbers, as they buy to sell again and to place lines with dealers who do not import products. This affords the members of the bureau the distinct opportunity to reap golden benefits through the zealous selling efforts of thousands of small dealers whom they could not reach in any other way than through this bureau.

The service is simple, complete and efficient. Besides constantly increasing in its worth to members, it supplies an immediate asset to any manufacturer of great value. It possesses result-producing factors that makes it a big feature in connection with any business that uses it.

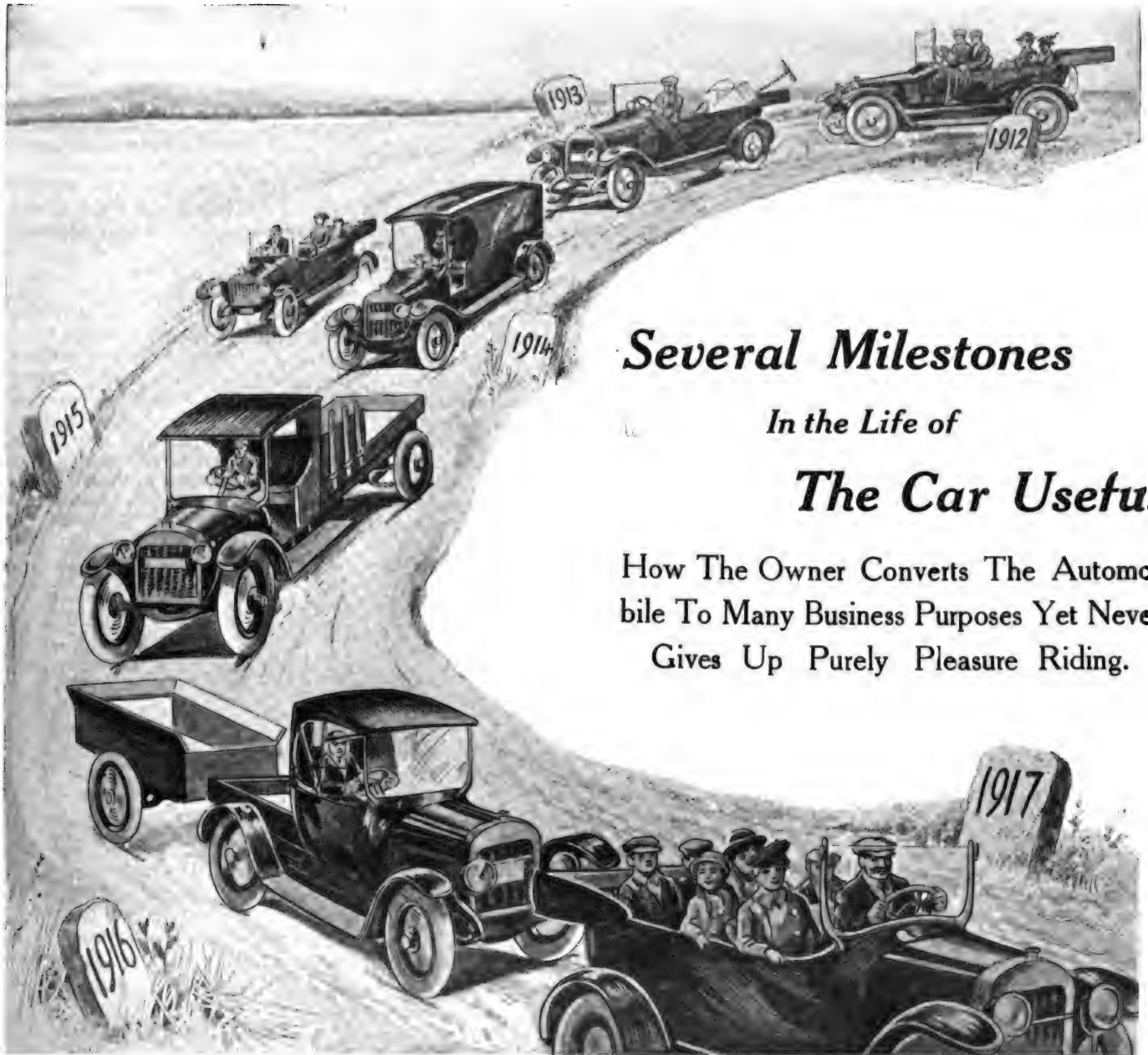
The bureau is conducted under the personal direction of T. Wesley Wright, with offices in New York City. His services are free to members. Mr. Wright is without question one of the best informed export men in America. He has developed this bureau to a degree of efficiency that makes it a business proposition of magnitude, wholly serviceable, worthy of the utmost confidence, and that will bring a magnificent reward to those who utilize it. The American manufacturer must realize that a foreign department is the best promotion feature of the day and hour. The time to develop the foreign field is now.

The Automobile Journal

VOL. XLIII.

MARCH 25, 1917.

NO. 4.



Several Milestones

In the Life of

The Car Useful

How The Owner Converts The Automobile To Many Business Purposes Yet Never Gives Up Purely Pleasure Riding.

PLEASURE cars turn the big curve of the Road of Time by an almost unvarying law of sequence, passing through successive stages in the course of the same ownership in the services they perform from the time they bear the members of the new owner's family out for their first airing in a motor driven conveyance, through varied phases of utility, until they come around again as a fixture in their original capacity.

The automobile comes first into the average man's life as something almost sacred, a votive offering to be laid at the shrine of leisure, a toy, a sensate mechanism, which is to thrill his jaded system with new, tingling sensations. It

is to be handled as carefully as the first watch his father gave him; to be fondled, caressed, carefully groomed and petted, as the old family horse was in the days of youth and care free happiness. As soon as he has his machine safely delivered in his keeping, after many days—or weeks as it may be under railroad conditions of delivery in recent years—his revel in the first joys of ownership of a car begins. He neglects the daily newspapers entirely to revel in the mysteries, cabalistic rules and ciphers of the instruction book. He joins the talk brigade in the lodge, the grocery store and around the garage, where the discourse is cams and carburetors, ignition and perdition, wherefore he soon learns to

anathematize the high price of gasoline fluently in seven different languages.

The first rides are strictly on pleasure bent. He takes the family along. They go over to Uncle George's, or Aunt Sally's, or Cousin John's. All admire the graceful lines of the car body, count the cylinders and lift a chorus of "Ohs" and "Ahs" at the operation of the self-starter.

After the short flights here and there through the parks of the city, or over the country, come some longer tours. The pleasure idea, which, it is to be said is never lost entirely, suffers, however, a drop in intensity. Some other things that must be attended to in life come to the front. Delights accompany these discoveries, too. It is found to be handy



The Tonford Truck Conversion Unit Attached to a Pleasure Car Chassis, Making Its Freight Carrying Capacity 2000 Pounds.

to take the car along to business. The utility idea is growing. Small bundles are easily tossed in the tonneau, and the number of errands that can be disposed of under gasoline locomotion is surprising. The speedometer spins and the mileage increases amazingly.

As usefulness in the daily round increases things begin to happen to the outward character of the car. One day the tonneau disappears and the sacred rites of pleasure begin to be pushed farther and farther into the background. This is the light delivery stage in the utilization of the pleasure vehicle in lighter pursuits of business. There is plenty of parcel carrying to do, and the family ceases to clamor for more motor rides, while father needs the car in his business. They take up moving pictures, anyway, and only take a pleasure ride once in a while when some fine morning in May inspires father to swing on the tonneau again and go away with them for a whirl out amongst the newly green hills.

The next stage of utility finds an express body mounted on the chassis. It is piled generously with whatever it is in the way of light loads the owner has occasion to carry. Now the machine is kept all day long down at the mill, the shop, the store and out on the streets.

Now it is a balmy, fine day again, and the folks at home are tired of the movies. The boys drive. After all it has been through the car is not so spick and span as it was and the family is no longer eager to ride in it. They like motor-ing, however. They have every reason to be indulged and no reason not to be. The vehicle, however, is by this time irrevocably committed to delivery work. So the upshot is — a new car. With

the eldest son at the wheel they may pass father on the road with the delivery car.

With some variations and deviations, the pleasure car in ordinary, follows the line of least resistance from its original status as a leisure hour plaything until it becomes a model of utility, an indispensable equipment in a particular line

ness are many. To the average motorist the problem is not so much how to get the change made, as it is to have the car fill the demands of double usage. With the advent of the second and later cars these problems solve themselves. Conversion units and auto trailers multiply.

Martin's patent rocking fifth wheel, by which any pleasure car in serviceable condition may be made into a tractor was one of the pioneers in the auto trailer enterprises, which have now grown so widely that there is a distinct auto trailer association.

This fifth wheel came upon the market with a cross wise hinge which admits of a longitudinal or fore and aft rocking motion, thus allowing the vehicle to conform to all road unevenness. Quick and easy of installation and capable of removal with the same facility, an appliance of this sort was bound to be revolutionary. It made possible the drawing of loads by a roadster in any strong one-horse spring wagon with a body not over 46 inches wide.

As one mechanical innovation follows another, the theories and practise of conversion from pleasure car alone to car of utility, likewise change, rechange and in-



Truckmobile Converted Chassis, Having Extra Long Wheelbase, Makes a Truck of Exceptional Strength and 3000-Pound Load Capacity.

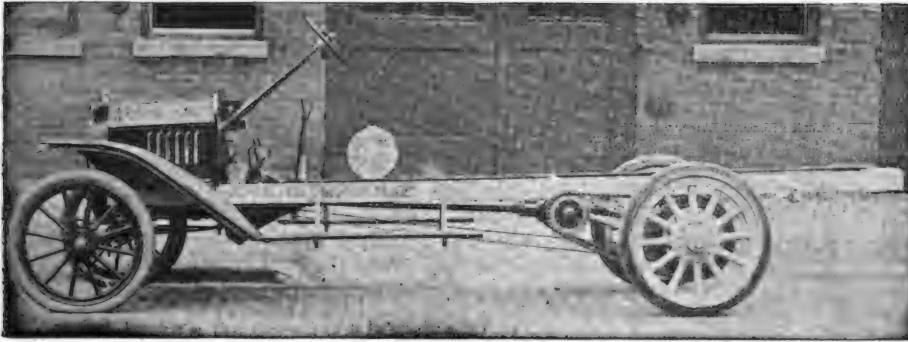
of light service and an indispensable adjunct to the home life as well. Besides a series of shiftings of the body and the use of conversion appliances, there are tractor possibilities for the engine and chassis of the original purchase. When this stage arrives the auto owner has the pleasurable desires of himself and family provided for with the latest pleasure car model and is himself committed fully to the gospel of the car useful.

The facilities for greater car useful-

terchange, continue a never-ending procession.

If the manufacturing figures in this particular phase of the automobile industry could be collected they would be found to be prodigious. Of the Dearborn conversion units, built by the Dearborn Truck Co., Chicago, Ill., and designed to convert Ford pleasure car chassis into trucks that will have a load capacity of 2000 pounds, several thousand cars are manufactured each day. The production





Dearborn Conversion Unit, Which Makes the Pleasure Car Chassis Available to Many Forms of Business Uses.

for 1917, unless plans are disrupted and the output curtailed, will approximate half a million. The Dearborn unit is an exceedingly practical assembly.

When the body of a pleasure car has become unsightly through wear, but the engine and chassis are still in good mechanical condition, it is simply the logic of service to convert it to other haulage uses. The Knox Traction Unit is found serviceable for heavy haulage. This unit, built by the Knox Motor Associates, Springfield, Mass., permits conversions into practical tractors that with semi-trailers will have load capacities of from 4000 to 6000 pounds. They are constructed with an eye to the advantage that the chassis, which carries the power plant, shall not be subjected to carrying load stresses, as it would be were it carrying a body and load.

Approaching in some of its elements practical truck construction, the Truckmobile is another unit designed and constructed for the purpose of converting pleasure car chassis into freight carrying vehicles. They are built by the Commercial Truckmobile Co., Chicago, and through their use thousands of motorists are able to get further and valuable service out of their pleasure cars which otherwise would be due to be discarded for the reasons of unsightly appearance.

Frequently the motorist turns to the Tonford conversion unit when the occasion arises to equip his car for the hauling of light freights, or turn it to uses of fast delivery. This is one of the well known conversion units and the Detroit Truck Co., Detroit, Mich., is building them in considerable numbers.

Smith Form-a-Truck is the trade name of a widely known and used conversion unit. Instead of manufacturing an entire vehicle it supplies the motor car owner, who is ready for that stage of use of his car with an adaptation, constructing them on a very large scale to provide haulage of loads up to one ton. With

this equipment available the man who wants a carrier of 2000 pounds capacity can readily provide himself by assembling a Form-a-Truck chassis with a new or used Ford chassis and install on it whatever type of body will best meet his requirements.

Taking for a basis the estimate in round figures of 3,000,000 cars as the number registered in the United States at the present time, by a little computation it is found that the American car owner has approximately \$3,000,000,000 invested in automobiles, upon which he spends \$275,000,000 annually for gasoline, \$300,000,000 annually for tires, \$15,000,000 for lubricating oils and \$20,000,000 for miscellaneous items, including insurance, rent and repairs, or a grand maintenance total of \$610,000,000. Consequently it is estimated that there is a car for every 30 persons.

Last year a billion dollars was spent for motor cars, which amount plus the \$610,000,000 maintenance and operating costs, figures out a per capita expenditure in the United States of about \$15. The enormity of this sum, it would seem, would elicit from the economists a renewal of the cry against ruinous extravagance, but not a murmur is heard as contrary to the general belief that over 75 per cent. of the pleasure cars in use are employed largely for business purposes and are therefore maintained under the head of business expenses. It is also true that only a small percentage of the annual outlay on automobiles is an expense that has been created, the fact be-

ing that most of this vast sum is money that was formerly spent as street car, railroad, steamboat or carriage fares, and a considerable amount represents money saved through more efficient and economical business methods that the automobile made possible.

There is hardly a business or professional man who owns a car but has discovered that it fits into the scheme of his business in some respect, either as an agency through which prompter deliveries can be made or as a means of keeping in touch with more people. The car is indispensable with the doctor, and lawyers find them far more serviceable than street cars in getting around to the different courts, and in time saved in seeing clients and visiting scenes of accidents and other places involved in legal action.

In retail and wholesale merchandising the automobile has become a permanent institution for the salesmen, collectors and in the delivery service. Municipalities use them in all departments where formerly the horse and buggy was employed by officials in getting around the city. They have given the movie picture industry one of its most valuable "props," hardly a picture being filmed without the use of one or more automo-

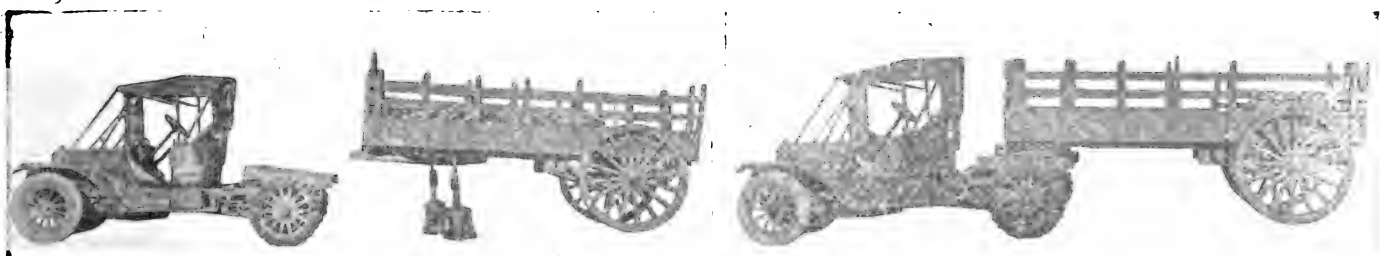


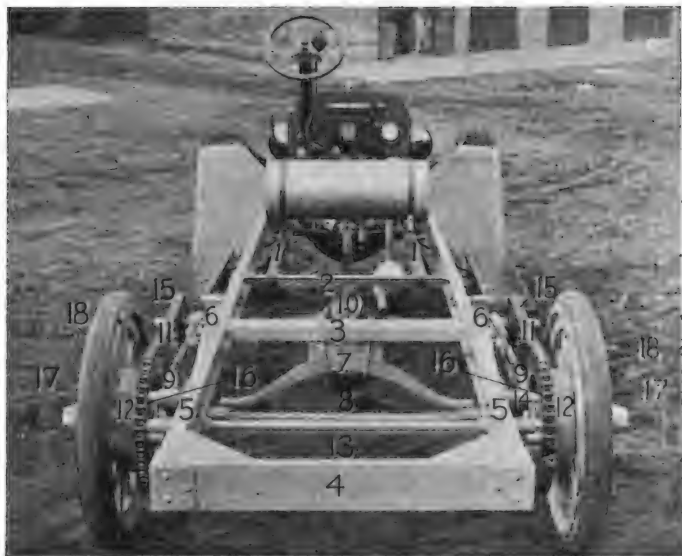
Pleasure Car Chassis Converted into a Medium Capacity Tractor with the Knox Traction Unit.

biles to get action and effect.

The automobile, in fact, is the natural successor to the horse for all business purposes, and the pleasure car is the logical successor to the driving horse as the motor truck is to the heavy draught horses. Even the farmer has adopted the light pleasure car in place of his old favorite driving horse and he can reach the village in one-third the time with the result that his social opportunities, as well as business opportunities, are greatly increased.

Devices that make the car's engine





The Components of a Smith Form-a-Truck Unit. 1—Ford Frame Side Members. 2—Front Cross Member. 3—Centre Cross Member. 4—Rear Cross Member. 5—Frame Side Members. 6—Springs. 7—Jack Spring. 8—Rear Axle. 9—Radius Rod. 10—Jackshaft. 11—Chains. 12—Brake Drums. 13—Spring Shackle Tie Rod. 14—Spring Shackles. 15—Front Sprockets. 16—Rear Sprockets. 17—Wheels. 18—Tires.

available for power for practically every purpose have been on the market for a long time with the result that the automobile on the farm is a combination, portable power plant, "carryall" and pleasure car. The farmer drives his car to the point where the power is needed, jacks up the rear wheels on a frame and through a power distributor, which consists of a jackshaft with two steel pulleys at either end, which are in contact with the rear tires, drives the corn sheller, wood saw, pumps water, bales hay, threshing oats, filling silos, milking cows or operates any of the other mechanical devices that are used on a farm.

One farmer who has a small roadster, not only uses it for pleasure trips Sundays and evening and for the various power needs about his place, but also transforms it into a vehicle for heavy haulage purposes through the medium of a fifth wheel and an old wagon body with the rear wheels attached. He removed the rear deck and attached the front end of the wagon with the fifth wheel and the vehicle was as manageable as any heavy cart and could be backed into any position.

In fact, there is not a service within the sphere of the horse that is not performed by the automobile more advantageously, as well as satisfactorily, possibly excepting that of furnishing the power for cultivating machinery. One manufacturer, however, has already started production on a device that can be used to transform the pleasure car into a tractor in a very short time and with this the car becomes an all around power unit for agriculturists.

There are 6,500,000 families in the country, living on farms or suburban estates, which number is over twice the actual number of automobiles now owned in this country. With the proof that the automobile is almost a necessity with

these people, the talk of an oversold condition in the motor industry becomes absurd.

The term "pleasure car" seems to be a gross misnomer as applied to the automobile, in view of the fact that it is used mainly in business pursuits of some nature most of the time. That term, however, was applied to the automobile in the early stages of its development, as even the manufacturers themselves looked upon it as an instrument of pleasure and little expected that it would develop into the wonderful institution that it has proved to be, and one that would have such a

vast economic effect upon civilization.

Along the Road of Time the automobile glides noiselessly, pleasure giving, efficient. Its practicality long established, like the brook by the roadside, it supplies a perpetual fount of gladness. Unlike the brook it will not keep going forever. At any rate, the same one will not. As it passes its several milestones it gives continuous value and when it comes to the end of its course, usually, it has well earned replacement.

HOUK WIRE WHEEL INTERESTS ARE SOLD.

The Wire Wheel Corporation of Amer-

ica of which John F. Alvord is the president, has acquired the George W. Houk Co. and the Houk Wire Wheel Corp. This sale includes the American rights to the British Rudge-Whitworth wire wheel patents, British Dunlop wire wheel patents, the patent holdings of the House Wire Wheel Co. and the Cowles, Cole and other patents covering wheel construction, mounting and attachment.

The banking house of Bertron Griscom & Co. of New York is handling the financing of the Wire Wheel Corporation of America. Mr. Alvord, the head of the new enterprise, is well known in automobile trade circles as president of the Standard Co., Torrington, Conn., the largest manufacturers of wire wheel spokes in the world, president of the Splitdorf Electrical Co. and the Hendee Manufacturing Co., Springfield, Mass.

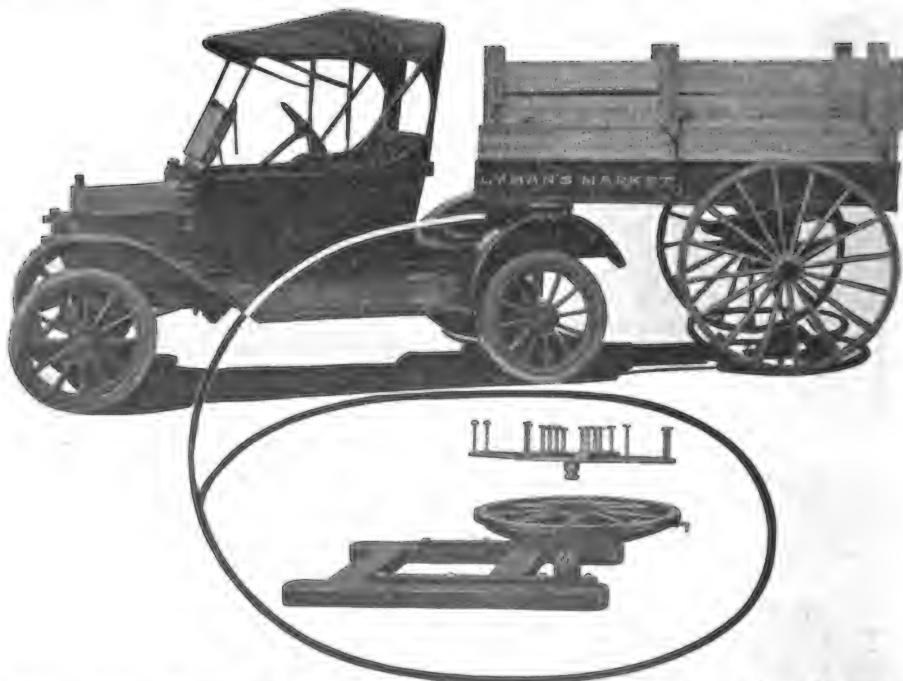
BROWN AUTO CARRIAGE RAISES CAPITAL TO \$750,000.

The Brown Auto Carriage Co., Cleveland, O., one of the largest manufacturers of automobile bodies in the country, has increased its capital to \$750,000. Plans for a greatly enlarged plant have been perfected and which will enable the company to accept the orders that it is at present obliged to refuse.

THREE ADDITIONS TO SNOW'S ORGANIZATION.

Walter B. Snow, the widely known advertising man of Boston, announces that Frank C. Thomas, Clarence C. Jones and Charles W. North have become members of his staff.

Mr. Thomas was formerly in the advertising department of the Cadillac Motor Car Co., was at one time manager of the Cleveland office of the J. Walter Thompson Co., and was in the advertising department of the Hardware Age.



Martin Fifth Wheel, the Basic Arrangement Permitting the Attachment of a Trailer to a Roadster Chassis.

Hire's Non-Breakable Windshield

Polished Plate Called Super Glass, With Celluloid Interwelded, Withstands Heat, Knocks and Pressure.

SUPER-GLASS is the name applied by the Hires Turner Glass Co. of Philadelphia, Penn., to a new product which has made its appearance in the market of safety first ideas for the automobile. As applied to the windshield and

ator has lost control of the machine as a result of being blinded by glass splinters.

Not only are personal injuries to be considered, but also the marring of the finish of the car. Ugly scratches upon the body and gashes in the leather seats are results of broken windshields or windows.

LOW CONSUMPTION OF OIL IN DOBLE CAR.

Since the appearance of the Doble car at the various automobile shows, many people who did not have an opportunity to talk over with the attendants the various points, owing to the crowds that constantly surrounded the new steamer, have wondered at the statement that the consumption of oil was only one gallon in 8000 miles of travel.

As a result, Abner Doble, the inventor of the car which bears his name, has taken it upon himself to explain the wonderful economy in oil. "The reasons," he says, "are simple and easily understood."

"Briefly put they are—the oil is not burned by high temperatures, nor is it subject to contamination. In the majority of motor cars considerable oil leaves

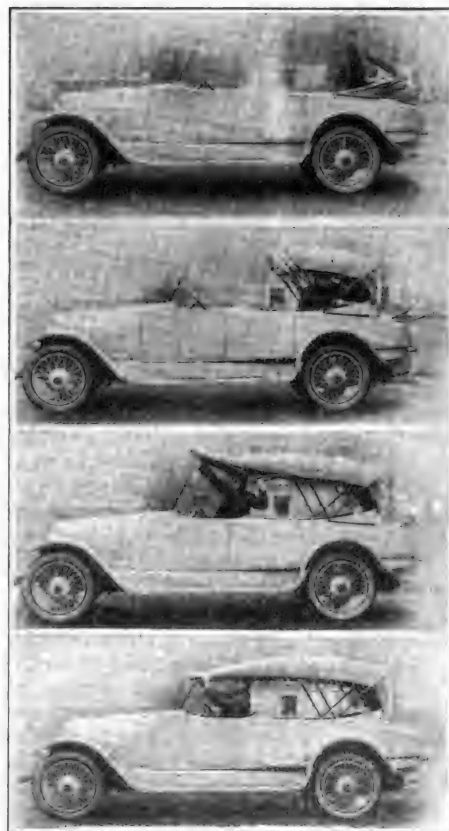
the crank case as vapor, due to its having come in contact with the lower piston walls. The oil which remains in the crank case of an internal combustion motor becomes quite rapidly contaminated by gasoline, carbon and 'road dust' working past the piston rings. That is why the instruction books advise such frequent changes of the crank case oil.

"In our steam car we exactly reverse these conditions; the oil is never heated to a sufficiently high temperature to burn it, and is completely isolated from the products of combustion. The lubrication of the cylinder walls and valves is accomplished almost entirely by the moisture present in the saturated steam used in the engine, consequently we use very little oil in the water or steam, and instead of the heavy oil formerly used in steam cars we use a light gas engine cylinder oil. This oil is too thin, especially when it is heated, to clog any radiator or boiler passages, and the velocity of the water passing through the lower headers of the steam generator is too high to permit any oil to collect.

"The chief function of this oil is to prevent scale from encrusting the generator tubing, and that it does this most effectually is one of the facts which we positively proved in driving my old car over 45,000 miles."

PATHFINDER'S STRIKING BODY INNOVATIONS.

Of the many cars seen at the recent shows few held as much attention on account of the body design as the Pathfinder, which incorporated two distinct features of unusual interest to the motorist. These features, or rather innovations, are the disappearing tops and concealed tire cases that have been incorporated in the new Pathfinder bodies. By this design the motorist is relieved of the bother of the extra equipment that has to be carried on a car, although not always in use. They are put out of the way where they do not collect dust or become injured by exposure to the weather, and yet are so located that they do not in any way hamper the use of the car or distort its proportions.



The introduction of these useful features on the Pathfinder result from a general change in body design. This year the company decided to build a higher powered car with more speed, which necessitated a heavier frame. The frame was also widened to the width of the body at the rear, and the top of the frame forms the sill of the body. With the extra space provided under the rear the way was open for handling the spare tire problem. A tire compartment was constructed in a horizontal position, lowering the centre of gravity of the weight.

The body extending out over this tire case in back formed an ideal place for housing the top, which swings back into it and is completely concealed and covered when the circular shaped section forming part of the rear deck is closed down.



windows the article was demonstrated at the recent Boston Show. The glass breakage item in motoring is no small one, and when there is breakage it is all too frequently attended with distressful results to the driver, or other occupants of the car.

Super-Glass is made up of two pieces of polished plate glass, between which is welded, under high temperature and tremendous pressure, a sheet of celluloid of the proper shade for the uses to which it might be subjected. The result is a solid piece of glass, transparent, strong and resilient.

This glass is designed for use in windshields or windows and the makers say a 22-caliber bullet cannot penetrate it. When hit by a powerful blow or struck by a hard missile there is no "shower" of flying glass or splinters, the result being simply a number of hair-like cracks, as shown in the illustration, the glass still remaining smooth on the surface, intact and strong, offering full protection from weather as before.

In many cases of smash ups and automobile wrecks the principal injuries have been caused by flying glass, results in many cases proving serious. Flying glass has often been the cause as well as the result of automobile accidents. There are cases upon record where the oper-

Opportunities in Russia

Commerce Expert Discusses the Revolution—the Most Dramatic Event in the Great War

Hon. Edward Ewing Pratt, chief of the Bureau of Foreign and Domestic Commerce, in speaking at a luncheon of the American-Russian Chamber of Commerce in New York recently, said he believed that in the promised reforms in Russia lay the clearing away of the one obstacle to the freest and frankest exchange of international relations between the two countries.

The crisis which has occurred in Russia was not only the most dramatic event of the great war, he said, but undoubtedly one of most far reaching consequences to Russia and to the future of the continent of Europe. Great as is the significance of this change for Russia and her allies, it has, even greater significance for the United States.

This is not a revolution in the commonly accepted meaning of the term, but rather the comparatively peaceful suppression of an inefficient form of government by the succession of a highly organized and efficient form of government. We need not look, therefore, to any reign of terrorism and destruction. On the other hand we may expect a very rational and much more efficient form of government, a government which will prosecute the work more effectively than its predecessors. Those who are interested in the trade relations between the United States and Russia see in the promised reforms in Russia the clearing away of the one obstacle to the freest and frankest exchange of international relations between the two countries.

Those who are interested in further developing the trade of the United States with Russia should also keep clearly in mind, without any misconceptions, the part which Germany has played in the development of commercial Russia and the part that Germany is likely to play in the commercial development of Russia. In spite of her unfortunate influence on the political institutions of Russia, Germany was performing a legitimate and economic function in that country, as evidenced by the fact that practically all the successful undertakings in Russia were prior to the war under German control. There was reason to believe that Germany may play an important part in the economic development of Russia after the war because Germany will be in a position to offer a legitimate service to that country. There was no doubt, however, that the Germans had failed to win the sympathy of the Russian people with whom they had been trading for many years. He doubted if, under the circumstances, the Germans would be able to win that sympathy in any business which they may engage with Russia after this war is over. The United States should profit by the example and failure of Germany.

The success of American capital in Russia would depend to a large extent on the spirit behind the American dollar. America had a good deal to teach Russia as regards industrial progress. Russia would probably prove an apt and appreciative pupil. With the establishment of a stable form of government and the resumption of peace there was no reason why young Russians should not come to the United States for their technical education, or why American technical men should not go to Russia to assist in building up a system of technical schools in Russia.

WILLYS-OVERLAND ADVANCES PRICES.

The Willys-Overland company has announced an increase in prices on six models, effective on April 1. From that date until further notice the Overland light four touring car will sell at \$695, having been advanced \$30. The roadster of the same type sells at \$680. The rise in prices also affects the Country Club model, which will sell at \$795. The price of the Willys-Knight four has also been advanced from \$1285 to \$1395. The Overland light delivery wagons have also gone up in price, the panel type now selling at \$730 and the express type at \$705.

The price of the Overland big four and the light six touring cars will be advanced on May 1. Advertising campaigns which had been prepared on these models made it impossible for the new prices of these cars to become effective for another 30 days. The prices given are f. o. b. Toledo.

FIRST MOTOR CAR SHOW AT CHARLESTON.

Charleston, S. C., recently had its first automobile show. The exhibition, which was under the auspices of the Chamber of Commerce and the Charleston Advertising Club, was held in a huge tent on Marion square. Over 30 different makes were shown and the attendance and business was so satisfactory that plans are being considered for holding another show, only on a larger scale, in the fall.

CLOSED CAR SALON AT DALLAS, TEX.

The closed car salon held by the automobile dealers of Dallas, Tex., in the Oriental hotel, during the first part of the month, proved highly successful from every point of view and will undoubtedly be repeated next year. Roy Munger, Munger Automobile Co., Cadillac distributors; W. F. Rose of the Ray Rose Co. and W. G. Langley, Franklin distributor, were the men who promoted the show.

GOODRICH PREFERRED REDUCED BY \$900,000.

At the annual meeting of the stockholders of the B. F. Goodrich Co., Akron, O., a cancellation of 9000 shares of the preferred stock of a par value of \$900,000 was ratified, reducing the outstanding amount of that class of stock to \$26,400,000. The directors of the company whose terms expired this year, were re-elected as follows: D. M. Goodrich, F. A. Hardy, C. B. Raymond, E. C. Shaw and H. E. Joy.

At a subsequent meeting of the directors the following officers were elected: President, B. G. Work; vice presidents, A. H. Marks, H. E. Raymond, E. C. Shaw; second vice presidents, C. B. Raymond, W. A. Means; secretary and assistant treasurer, Guy E. Norwood; treasurer, L. D. Brown; assistant treasurer, J. C. Lawrence. The following executive committee was appointed by the directors: B. G. Work, A. H. Marks, H. E. Raymond, E. C. Shaw, C. B. Raymond, W. A. Means and A. B. Jones. L. D. Brown and F. C. Van Cleef were added to the operating committee.

U. S. RUBBER BUYS SUBSIDIARIES.

The stockholders of the U. S. Rubber Co. at a recent meeting held in New Jersey, authorized the issue of \$97,252,900 first and refunding mortgage gold bonds, the amount of the company's full paid preferred and common stock outstanding on Jan. 13, and also authorized the purchase of 14 subsidiaries of the parent company, which companies at present are almost entirely owned by the U. S. Rubber Co.

Col. Samuel P. Colt stated at the meeting that he expected the company's gross business this year would be well above \$150,000,000, and estimated the net earnings during 1916 at \$12,500,000. Last year's sales were \$125,000,000.

WILL BUILD DEY ELECTRIC IN PLANT AT YORK, PENN.

J. W. Guthrie and H. W. Hayden are preparing a factory at York, Penn., for the manufacture of the Dey electric car. This car, which will be fitted with the patented axle and motor system invented by Dr. Steinmetz of the General Electric Company, it is understood, will be the lowest priced electric car on the market. The makers expect to have the car on the market late in the spring.

REO MOTOR CAR CO. BUYS GIER STEEL PLANT.

The Reo Motor Car Co., Lansing, Mich., has purchased the plant of the Gier Pressed Steel Co. of that city. The building, which has a floor area of 44,000 square feet, will be used for storage.

EISEMANN OPENS CHICAGO OFFICE.

The Elsemann Magneto Co. has opened a sales office in Chicago at 910 South Michigan avenue.

Auto Men Helping United States to Mobilize

Leaders in Motor Car Industry Take Conspicuous Part in Organizing Resources
—Average Motorist Contributes by Listing Cars for Service as Called Upon

SECRETARY of War Baker has appointed several well known men in the automobile accessory trade as members of the Council of National Defense, which with the number of prominent automobile men already serving on com-

the United States.

The men appointed by Secretary Baker are: E. A. Deeds, president of the Dayton Electrical Laboratories; W. H. Van Dervoort, president of the Moline Automobile Company, and Frank A. Scott of the Warner & Swazey Co.

During the latter part of the month there was a movement among automobile clubs and organizations throughout the country to organize their members into a body that could be called upon at short notice to assist in the mobilization and movement of troops in case of war with Germany, which it is expected Congress will declare when it meets April 2 in accordance with the call for an extraordinary session, now called by President Wilson. The Massachusetts, New York state and other militias that were called out used automobiles to a large extent, but there was no organized movement among the automobile owners in this service.

In practically every state, work is being carried on to list the different automobile owners and the type of car they own, and as to the service that could be expected of it. As practically every branch of the army has duties in which the automobile can play an important work, it is believed that in the event of war the thousands of machines that can be secured will be eagerly taken by the army officials.

In many cities classes have already been formed among women for instruc-

tion in automobile repairing and maintenance to enable them to take the place of men capable of bearing arms, should circumstances warrant it.

In the preliminary preparations already under way the plans include the



E. A. Deeds, President of Dayton Electrical Laboratories.

mittees that will become active in case of war indicates that the leaders in the motor car industry will take a conspicuous part in organizing the resources of



W. H. Van Dervoort, President of Moline Automobile Co.

use of great Indianapolis shops for the building of aircraft and many racers would be recruited as airmen for military service.

NORTHWESTERN CHEMICAL INCREASES CAPITAL.

The Northwestern Chemical Co., Marietta, O., manufacturers of the "Chemically Correct" line of automobile specialties, has increased its capital stock of \$20,000, all common, to \$150,000, divided into \$100,000 common stock and \$50,000 preferred stock.

The company's rapidly growing business necessitated an increase in the capital stock to provide additional working capital. New buildings will be erected and additional machinery purchased in order that larger stocks of merchandise may be carried to facilitate deliveries. Hereafter the company will not be dependent upon individual shipments of raw materials, which at present is a serious problem with most manufacturers.

Warehouse stocks carried at New York and Oakland, Cal., will be increased and a new warehouse will very likely be opened in Chicago within the next few months. The company's plants at Marietta now have a combined floor space of over 30,000 square feet. Ground has already been broken for an addition

and in the near future a second addition will be erected.

EMERSON MOTORS STARTS DELIVERY OF NEW CAR.

The Emerson Motors Co., Inc., have been making deliveries of the Emerson Four at the rate of over two a day for the past month. The price has been advanced from \$395 to \$545, which includes full equipment, electric starting and lighting system, speedometer, demountable rims, top, windshield and tire carrier.

CONCRETE HIGHWAYS MAGAZINE.

The Portland Cement Association, 111 West Washington street, Chicago, is publishing a monthly entitled the "Concrete Highway Magazine," which is devoted to news and developments in connection with concrete roads, streets and alleys. The illustrations of the first issue are of excellent examples of concrete highways in different parts of the country. This will be made a feature in future issues of the magazine.

COVERT GEAR OFFICES MOVED TO DETROIT.

F. E. Mosher, secretary and general manager of the Covert Gear Co., Inc., of Lockport, N. Y., manufacturers of transmissions, in speaking of the company's action in moving the entire sales, engineering and service departments to Detroit, said:

"By establishing not only our sales, but also our engineering and service headquarters at Detroit, we feel that we are initiating a movement which will be followed eventually by every parts and accessory concern located away from the hub of the motor industry. Through our Detroit offices it will now be possible to maintain close relations with our clients in Detroit and vicinity which our volume of Michigan business deserves."

All correspondence relative to any of these three departments should be addressed direct to the Covert Gear Co., Inc., 967 Woodward Ave., Detroit, Mich., instead of Lockport, N. Y.

Racing Outlook Uncertain

War to Stop Indianapolis Event— Sheepshead Course to Be Sold

WITH the outlook for the 1917 racing season on the speedways and tracks very bright and preparations well under way among the contestants and course managers, sudden developments have come up that indicate a much restricted sport.

Possibilities of war and other happenings of recent date will in any event detract from the keen anticipation that the followers of the sport felt at the bright prospects for the season. One of the most disappointing features in the outlook is that Dario Resta will not compete.

Just what effect the sale of Sheepshead Bay Speedway will have on the events scheduled for that course is not known. Justice Callaghan of Brooklyn has issued an order appointing Nelson L. Keach as referee to sell the property to satisfy a debt of \$2,135,161.86. The debt represents a mortgage of \$2,040,000 and interest, foreclosed recently by the Coney Island Jockey Club, owner of the race track and grounds on which the speedway was erected.

An announcement of importance in connection with the racing season is that the feature race of the year, the annual 500-mile automobile race at Indianapolis, scheduled for May 30, will probably not be held. This announcement was not made until after the speedway management had sent out the entry blanks.



C. E. Fay, Maxwell Distributor.

C. E. FAY BUYS MAXWELL RETAIL BRANCHES.

Charles E. Fay, for many years head of the big distributing plant of the Ford Motor Co. at Cambridge, Mass., has formed the C. E. Fay Co. and will handle the Maxwell car in Eastern Massachusetts and Rhode Island.

He recently signed a contract for this territory with T. J. Toner, sales manager of the Maxwell Motor Co., which involves the distribution of over \$10,000,000 worth of Maxwell cars. His company will take over the Maxwell branches and service stations at 867 Boylston street, Boston, and on Broad street, in Providence, R. I. While the Fay company will handle the retail and wholesale sales in the territory specified, it will affect the wholesale branch of the Maxwell Motor Co. on Newbury street, in Boston, which has been in charge of Hoover Holton.

E. H. Evans, who was associated with Mr. Fay for many years while the latter was developing and building up the big Ford organization in New England, resigned to join the new Fay company as assistant to its head.

JOHN M. STUDEBAKER DIES AT SOUTH BEND.

John M. Studebaker, honorary president of the Studebaker Corp., manufacturers of Studebaker cars, died at his home in South Bend, Ind., March 16, at the age of 84 years.

He was born in Gettysburg, Penn., the son of a blacksmith and carriage maker. After learning his father's business he went to California seeking gold, but upon his arrival decided to enter the blacksmith trade. Five years later he returned to South Bend, Ind., where his brother Henry had started a carriage manufactory, and with his savings, which had totaled over \$7000, he purchased a half interest in the business. Later when his brother Henry retired he took in his two younger brothers, Peter E. and Jacob F., and organized the Studebaker Bros. Manufacturing Co., which became one of the largest, if not the largest, concerns in the carriage and wagon business in the world. With the advent of the motor car the company branched out into the automobile business and several years ago the name was changed to the Studebaker Corp.

COLUMBUS CO. BRINGS OUT NEW COLORS.

The Columbus Varnish Co., Columbus, O., manufacturers of the well known Peerless automobile finishing varnishes, have added six new colors to their line, royal blue, black, gray, brewster, medium yellow and red. These varnishes are made along similar lines to the high grade color varnishes as used in finishing new automobiles. They have a very rich tone and are not ordinary paints. They will be marketed in same style of package as other Peerless automobile specialties manufactured by the company.

COMING EVENTS

AUTOMOBILE RACES.

Clinton, Ia., Clinton Auto Dealers' Assn. March 27-31
Deadwood, S. D., Management of J. E. Nelson March 27-31
Calumet, Mich., Frank Ketchell, Mgr., at Coliseum April ..
Los Angeles to Salt Lake City road race ..
Stockton, Cal., San Joaquin Auto Trades Assn. April 4-7
Uniontown, Penn., Speedway May 10
New York, Sheepshead Bay, Speedway, Metropolitan May 19
Walla Walla, Wash., Track May 30
Indianapolis, Ind., Championship, Speedway May 30
Uniontown, Penn., Speedway May 30
Chicago, Ill., Championship, Speedway June 9
Kansas City, Mo., Speedway June 16
Cincinnati, O., Speedway June 28
Omaha, Neb., Championship, Speedway July 4
Spokane, Wash., Track July 4
Tacoma, Wash., Speedway July 4
Uniontown, Penn., Speedway July 4
Visalia, Cal., Road Race July 4
Henton Harbor, Mich., Track July 4
Des Moines, Ia., Speedway, Championship July 14
Missoula, Mont., Track July 15
Buffalo, N. Y., Inter-city, Road July 17-19
Anaconda, Mont., Track July 22
Tacoma, Wash., Championship, Speedway July 28
Great Falls, Mont., Track July 29

Kansas City, Mo., Speedway (dirt) Aug. 4
Billings, Mont., Track Aug. 5
Elgin, Ill., Road Race Aug. 18
Spokane, Wash., Interstate Fair Sept. 2-9
Cincinnati, O., Championship, Speedway Sept. 8
Red Bank, N. J., Track Sept. 6
Pikes Peak, Col., Road Climb Sept. 8
Milwaukee, Wis., at State Fair Park Sept. 9-15
Providence, R. I., Championship, Speedway Sept. 15
Allentown, Penn., Track Sept. 22
Trenton, N. J., Track Sept. 28
New York, Sheepshead Bay Speedway, Championship Sept. 29
Uniontown, Penn., Speedway Sept. 20
Kansas City, Mo., Speedway Oct. 6
Uniontown, Penn., Speedway Oct. 6
Danbury, Conn., Track Oct. 6
Chicago, Ill., Speedway, Championship Oct. 13
Richmond, Va., Track Oct. 13
New York, Sheepshead Bay Speedway Oct. 27

SHOWS AND CONVENTIONS.

Clinton, Ia., Show, auspices Clinton Auto Dealers' Assn. March 28-31
Atlantic City, N. J., Show, management S. W. McGill March 31-April 14
National Association Automobile Accessory Jobbers, Convention, Summer meeting, at Homstead Hotel, Hot Springs, Va. June 4-6
Milwaukee, Wis., first annual used car show April 20-26

Deficiencies in the Vaporization of Fuel

Difficulties in the Internal Combustion Engine of the Automobile
Attributed to Changes in the Characteristics of the Mixture Rather
than Motor Faults, in Carburetion Discussion Before S. A. E.

By F. C. MOCK.*
(Member of the Society.)

While the automobile world is waiting for the bureau of mines and standards to systematize, so far as practical, the composition of the different gasolines and grade them properly, the car user depends on expert guidance on how to get the best results out of his engine without being in possession of an analysis of his fuel. In this paper there is an authoritative discussion of the "hot-spot" principle in bringing about a proper evaporation in the intake manifold, with other valuable points on difficulties of carburetion in multi-cylinder engines. The discussion also presents much that is of value in the line of fuel supply opinion.

Presented at Indiana Section Meeting.

THE internal combustion engine, as used in the automobile, was initially designed to operate upon a fuel mixture of gasoline vapor and air. Our present engines are unchanged in this regard, but the fuel available has changed so much in its characteristics that it cannot always be delivered as gasoline vapor. I believe that a major part of the troubles that occur in the operation of our automobiles today is at least connected with deficiencies in the vaporization of the fuel.

If the fuel is introduced into the engine in other than vapor form, we encounter a number of difficulties. First, peculiar to multicylinder engines, is the practical impossibility of conducting the liquid gasoline from a single carburetor or discharge point to the different cylinders in equal quantity. If the gasoline were in pure vapor form, or in such small drops or particles as to be wholly air borne, it would respond to the successive suction of the individual cylinders exactly as does the air. But when portions of it are allowed to gather in liquid form in the manifold, or to spatter on the walls at the bends, the further flow can scarcely be controlled, and some cylinders inevitably receive a great deal more of the liquid part of the fuel than others, regardless of the care given to distribution in the manifold design.

Another difficulty, of equal importance in the operation of the automobile, involves the time element. In automobile use the engine must vary continually in speed and torque. These variations are universally controlled by regulation of the fuel supply by means of a throttle valve at the entrance of the intake manifold. When the position of this throttle valve is changed the air flow through it responds almost instantaneously, but if the corresponding gasoline supply, after leaving the carburetor, collects on the intake manifold walls, its flow to the cylinders is greatly retarded. As a result we have the condition that on quick throttle openings the gasoline supply to the cylinders lags behind the air, giving a temporarily lean mixture; conversely, as the throttle is closed, it traps in the manifold on the way to the cylinders more gasoline than is necessary to take care of the air therein, so that the mixture is very rich as the engine speed decreases.

An even more vital point is contingent upon the fuel being in a state of vapor in the cylinders. Fortunately, this rarely enters into the use of the automobile with the present fuel. A certain density of vapor is necessary around the spark plug before ignition can begin to take place, so that the flame can begin to propagate from the burning particles immediately in the path of the spark. The density of the vapor of any substance is limited by its volatility, as generally ex-

pressed by its vapor tension curve and by the temperature. With liquids of such low volatility as kerosene, the vapor in the cylinder, even after compression, can be too rare to permit of flame propagation with the cylinder temperatures common in the closed throttle driving on pleasure cars. This, I believe, is the great difficulty that stands in the way of the use of kerosene as a pleasure car fuel. When the engine is very cold we have to a certain extent the same difficulty with the low grade gasoline of today. When the cylinder walls are around 32 degrees Fahrenheit it is necessary to have a strong spark and to nurse the air supply carefully before the first few explosions can be obtained.

VOLATILITY OF FUELS.

All questions of carburetion and intake manifold design thus hinge naturally upon the volatility of the fuel, and it is worth while at the outset to detail a few characteristics connected with these points. If a flask of ordinary Chicago gasoline containing a thermometer is placed in an oil bath or in an equivalent arrangement, and is heated, a peculiar action takes place. The temperature rises, along with the temperature of the bath, until a point is reached (at about 195 degrees Fahrenheit) when the gasoline commences to bubble. As the liquid begins to bubble rapidly, the temperature ceases to rise. By and by the bubbling stops and the temperature rises again until another boiling point is reached, when the bubbling will start as before and continue until this element is boiled away, and so on.

Thus we see that gasoline is composed of a number of elements of greatly varying volatility; this complex structure is the cause of a number of curious things that we notice in dealing with carburetion.

LIMITATION OF VAPOR CONTENT MIXTURE.

As is generally known, the maximum vapor density of any given substance depends on its temperature. If we wish to fill a chamber or closed space with a certain amount of vapor of any liquid, we can introduce the amount of liquid required, allow it to evaporate and sometimes we can regulate the amount of vapor by the amount of liquid used. But if we keep on trying to increase the vapor present by adding liquid, we reach a point when no more fluid will be taken up, and the vapor in that space is "saturated." If we apply heat, more liquid will be taken up, and the vapor density increased before the saturation point is again reached. Thus there is a different maximum vapor density for each temperature.

Applying this to our gasoline elements, I have prepared a chart, Fig. 1, to show by the heavy zigzag lines the limiting vapor density, at different temperatures, of the elements found in our present day gasoline. The density is expressed by the ordinates in pounds per cubic foot. The abscissas indicate the relative percentage of each element present in a recently distilled sample of Chicago gasoline. Thus, considering first the single element boiling at 320 degrees Fahrenheit, which is about an average in its characteristics the weight of hydrocarbon combustible in a cubic foot of vapor at 32 degrees Fahrenheit would be 0.0003 lb.; at 75 degrees 0.0014 lb., and at 125 degrees 0.0067 lb.

If instead of vapor this were suspended particles, we might say that at 32 degrees Fahrenheit we had a thin smoke; at 75 degrees a fairly thin smoke, and at 125 degrees a thick black smoke.

Now the practical point of this is as follows: A cubic foot of air at 100 degrees Fahrenheit weighs about 0.071 lb. If we

*Engineer, Stromberg Motor Devices Company.

wish to secure perfect chemical combustion we must combine with this one-fifteenth its weight in vapor, or 0.0046 lb. of vapor in the same cubic foot of space. But it cannot be done—with this gasoline element—at 100 degrees because one cubic foot of saturated vapor contains only 0.0036 lb. If this space were the intake manifold of an engine and we were to inject, in the finest spray possible, this 0.0046 lb. of vapor, only part of it would evaporate. The rest would settle on the walls unless we raised the temperature of the mixture to say 110 degrees, which would mean, allowing for evaporation, that the entering air should be heated to about 150 degrees.

OBTAINING COMBUSTIBLE MIXTURE.

But there is another way to obtain a combustible mixture. The above assumption was based on full charge of air, such as we have with a wide open throttle. Imagine that we close the throttle, decreasing the supply of air and gasoline alike until one-third the former charge of each is admitted. This vapor, occupying the same space as before, will be thinner and will weigh only 0.00155 lb. We can easily get this density at 100 degrees Fahrenheit; in fact we could lower the temperature to about 77 degrees and still have complete vaporization. This is illustrated every time a person starts out to drive with a cold engine. At first, after starting, the throttle can be opened only a little way before the engine balks—in a minute or so, as it warms up, it can be opened farther, and so on, showing definitely that the amount of vapor charge is limited by the temperature.

We know, however, that the engine will run cold, by using a dash control and giving more gas, although according to the foregoing the vapor charge apparently cannot be increased. The reason is, that other elements in the gasoline are more volatile than the central 58 degrees part, and their presence permits the richer vapor charges necessary.

So long as the temperature at the vapor density desired is below the limiting value, the action of the engine can be controlled by gasoline adjustment. Above this limiting temperature it cannot, and as many of us have found, there is a limit to the amount of increase of gasoline that can be used with a cold engine. The unvaporized portion gathers and forms puddles in the intake manifold, thus entering the cylinders irregularly and intermittently; when it does enter it vaporizes during the compression stroke, so that the mixture may be alternately too rich and too lean for combustion.

ACTUAL CONDITIONS IN INTAKE SYSTEM.

As the foregoing indicates, it is impossible for all the gasoline to enter the engine as vapor under certain conditions of operation. Just what becomes of the unevaporated part we have been able to observe to some extent by the use of glass carburetors and glass windows in intake manifolds.

Engine Idling.

With the engine idling, in most carburetors the suction on the jet is somewhat lower than at ordinary driving speeds. The gasoline therefore leaves the jet at an extremely low velocity and in fairly large drops, no action of evaporation being perceptible. As these drops pass the throttle, however, a remarkable change takes place in their size and condition, owing to the fact that the air is going through the throttle orifice (at a velocity greater than that of sound) into the vacuum of eight to nine pounds that exists in the intake manifold when the engine is idling. As a result the gasoline is torn into a very fine spray indeed. Even so, if no hot air is used with the carburetor and no heat applied to the wall of the intake manifold, there is a certain amount of condensation so that the walls appear moist.

When an engine "loads" idling, this cause is nearly always below the throttle in the carburetor. The gasoline drops do not leave the jet with sufficient rapidity to fly all the way up to the throttle, or strike some obstacle upon which they gather and drop back, so that the lower space of the carburetor tends to fill; then when the throttle is opened and the air velocity through the carburetor increased, this excess collection of gasoline makes itself felt in the operation of the engine.

Partly Opened Throttle.

As we open the throttle the suction on the jet becomes greater, so that the gasoline comes off in small drops, but

the vacuum above the throttle becomes lower, so that less atomization takes place at the throttle orifice. Also as the density of the gasoline vapor is increased more liquid becomes visible on the manifold walls and tiny drops begin to appear in the mixture, which when idling was in the form of a barely visible mist. At ordinary running on a smooth road these drops are usually so fine that they are carried into the cylinder along with the air, are further atomized when passing through the intake valve and completely vaporized during the compression stroke.

Wide Open Throttle.

As we open the throttle a remarkable change occurs in the appearance of the mixture. Scarcely any mist or vapor is present, and the particles pass along the intake manifold without diminishing in size when leaving the jet. They then impinge either upon the carburetor walls or on a bend in the manifold, where they tend to remain and cling to the wall in fluid form, thence being carried along by the air friction alone. In passing along the liquid drops to the bottom of the air passage, sometimes gathering one-quarter inch or more deep, if the manifold is of poor design.

This trouble with loading is confined to low air speeds, as at higher speeds the air friction is sufficient to keep the gasoline particles in rapid motion regardless of their size. This is the reason for the improvement often found in operation when the intake size is decreased. It also explains the harm caused by enlargement or expansion chambers in the intake line.

Acceleration.

Perhaps the most remarkable demonstration that can be made with a glass manifold is that of changing the throttle position at the lower engine speeds when the air velocity does not carry the unvaporized particles, but permits them to drop. At closed throttle very little of anything can be seen—the vapor being invisible—except some moisture on the walls. At wide open throttle the mixture appears as a central column of fog and as tiny particles of liquid with a film of liquid gasoline traveling slowly along the walls, deepest at the bottom.

After idling, if the throttle is opened suddenly, only the central column appears and there is a definite wait—it can almost be timed with a stop watch—before the stream of liquid gas appears. If the throttle is then closed the manifold is filled for a few moments, with a dense white fog, the liquid apparently evaporating off the walls, after which the normal idling condition is established. These actions are very marked and anyone who has observed them can readily understand why it is difficult to make an engine respond to changes in throttle at low speeds.

Use of Kerosene.

When an engine is rotated by external means, using kerosene in the carburetor, there is an accumulation in the manifold even with the throttle closed, while at wide open throttle the accumulation is much worse than with gasoline. I have not been able to determine any temperature, under the limitation of water heat, whereby this accumulation is avoided.

PRESENT CARBURETOR FUNCTIONS.

Everyone who has actually observed the phenomena described, wonders how the engine can fire at all; yet we can overcome these difficulties to a surprising degree by regulating the mixture proportion in the carburetor to conform to the limiting conditions of vaporization and the state of the gasoline in the intake manifold. The following different points of regulation are not only what we have found necessary in our own work, but are definite tendencies in the carburetor development of today, which will be found applicable so long as our engine fuel continues to consist of a gradation of elements of different volatility. With a fuel of homogeneous content such as benzol or alcohol, it will be impossible to overcome deficiencies in evaporation by graduating the mixture, and engines can operate only by having sufficient heat for the vapor density necessary, or by the air charge being restricted during the warming up period to conform to the vapor density available.

A tendency of carburetor construction is to accommodate the mixture proportion, by some means or other, to the fact

that less gasoline proportionally needs to be fed with small air charges, when vaporization is complete, than with large air charges. This began to be apparent several years ago in the tendency toward double jet carburetors. It was believed then that the double jets were necessary to establish a uniform mixture, but we have now found that they do more than that. The low speed jet was usually set for a lean mixture, such as can be used at closed throttle, while the high speed jet was set to give a richer mixture proportion, so that the mixture was economical, during whatever part of the carburetor operation the low speed jet only was working; when the high speed jet came into use the mixture became somewhat richer, giving more nearly the powerful mixture required.

The problem was also attacked from what might be called the opposite direction by a number of "economizers," which embodied some means of admitting air to the intake manifold beyond the carburetor through a suction controlled valve. These operated by virtue of the fact that at closed throttle, when a lean mixture can be used, there is a high vacuum in the intake manifold and the valve will open to admit air and dilute the mixture; then when the throttle is opened wide the vacuum decreases so that the valve will close. The early devices of this type encountered the difficulty that when idling the intake manifold suction is highest of all and the smallest amount of air admitted makes the mixture too lean to run; it is necessary to use an action, so that at nine pounds suction for instance the valve is shut, from eight to six it is open and from six pounds down to wide open throttle the valve closes again.

The drawback of these devices is that the amount of air they admit tends either to be constant or to decrease as the throttle is opened, while the amount of dilution that can be tolerated increases with the throttle opening on the ordinary driving range. The dilution range of these devices does not correspond to the range of the carburetor except in exceptional cases. Nevertheless, they sometimes make enough difference to show remarkable gains in economy.

RICH MIXTURE FOR ACCELERATION.

Another definite tendency of carburetor design is shown in the general employment of some device that will either give an excess of gasoline, or will restrict the air, when the throttle is opened quickly. This action is used to compensate for the lag in the flow of gasoline to the cylinders, as previously described, after a quick throttle opening. Dashpots were the first means used. Besides keeping the air valve from fluttering unduly under fluctuations of the engine suction, they retarded its opening whenever the carburetor suction is increased. The suction on the jet was thereby made higher than normal, thus giving the richer mixture desired.

Other devices have been used that accelerate the flow of gasoline, instead of retarding that of the air. These, of course, give a greater volumetric efficiency for the first charges following the throttle opening. Such devices operate in various ways, sometimes with a syringe piston connected to the throttle and injecting an extra amount into the carburetor, or sometimes with a syringe simply connected to accelerate the gasoline discharge on its way from the float chamber to the jet. A combination of the dashpot and the syringe action has also been employed with good results.

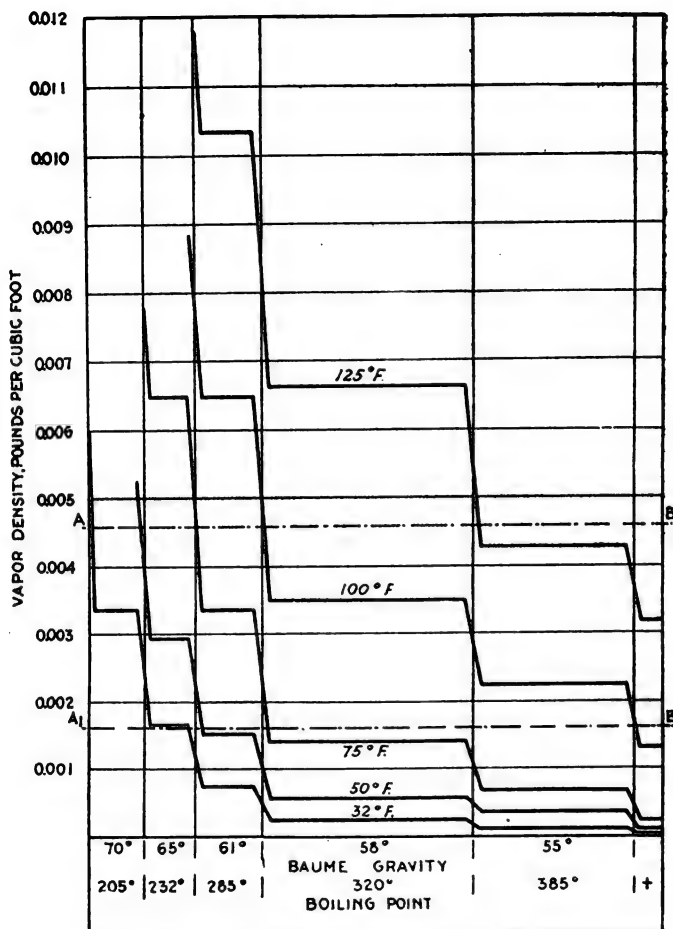
Other constructions have been used, which take advantage of certain changes of condition in the carburetor following the throttle opening in order to increase temporarily the gasoline flow. The vacuum above the throttle falls from a high value to a low one, and this change can be employed, by means of a small manometer U tube construction, to release a small quantity of gasoline. In carburetors in which the suction on the jet increases with the amount of air admitted, a passage like a manometer tube can be formed with one leg in a point of suction and the other exposed to the atmosphere, so that on an increase of suction the manometer is emptied. These last constructions are used in the plain tube type of carburetors, and, besides being wholly automatic, seem to function more nearly as required for the natural needs of the engine than do syringes, because their discharge can be made to last through a longer period of time.

According to the theory on which the above conclusions are based, it is also desirable to suspend the gasoline flow

temporarily when the throttle is closed again from wide open position. This gives a cleaner return from high speed and much smoother action on rapid changes of throttle position, such as are necessary when passing through city traffic. Care must be used in developing this action, because if it is carried too far there is danger of the engine "stalling" when it comes back to the extreme idling condition.

APPLICATION OF HEAT.

Though it is not wholly a question of carburetor design, the value of the increasing use of heat is undoubtedly appreciated by everyone. Heating the air supply and the intake manifold are the means most generally used. The water jacket on the carburetor has not been used so much in the last few years, possibly because the boiling point of water (212 degrees Fahrenheit) is not high enough to keep the gasoline from accumulating and loading.



Limits to Vapor Densities of Gasoline Elements.

The application of heat is sometimes opposed on the ground that it reduces the volumetric efficiency by expanding the air charge. There is really no cause for this objection, since the temperature needed for good operation does not reduce the power to any noticeable extent. It is only sensible, therefore, in view of the importance of an adequate heat supply and the slight expense involved, to make the heaters of sufficient capacity for winter use, and then fit means, either manual or automatic, of decreasing the temperature in the summer time.

ATOMIZATION OF HEAVY GASOLINE.

There is just one way we know of to remedy the difficulties we experience with our non-evaporating gasoline, without involving either resistance to the air flow or considerable expansion of the charge of air. This way lies in heating, by exhaust heat, the portions of the intake manifold on which the heavy gasoline particles impinge or collect, thus applying the heat directly to the heavy unevaporated gasoline. The gasoline then takes up the heat and passes very little on to the air stream, so that the volumetric efficiency

is scarcely affected. We call this the "hot-spot" principle, and find it gives good results indeed, particularly when the jets discharge with high velocity directly out of the carburetor, so that the gasoline spray strikes upon the "hot spot." The engines then warm up quickly in cold weather, much less difficulty is experienced on acceleration, and there is no trouble from loading when pulling on a hill at low speed. In locating the "hot spot," we should bear in mind that the heavy gasoline particles will not make the bends along with the air current, but will continue straight on to the opposite wall, and then gradually drain toward the bottom.

It will contribute greatly to easy warming up and, in fact, starting, if we design the intake manifold with the idea that during those conditions we are simply trying to carry liquid gasoline along an air conduit; we, therefore, must make the connections to all the cylinders from the manifold passage equal in shape, diameter and rise, also with the minimum rise possible, and keep the manifold area just as small as maximum power considerations will permit.

There are gasolines used in some parts of this country, notably in the far West, of which the whole amount boils away below 250 degrees Fahrenheit and naturally none of the above mentioned difficulties is encountered; in fact, some of the means of mixture gradation, if not carefully limited, prove a detriment instead of a help. There are also blended gasolines in use, of which parts require all the heat that can be gotten to the carburetor, while others, so light as to almost boil at the heat of the hand, will change to vapor and boil violently in the carburetor under the temperatures needed to handle the heavier elements. In many cases when we have had trouble reported with dirty plugs or in exceptional difficulty with gasoline in the crank case, this gasoline has been found to be the cause. I believe we can scarcely exaggerate the importance of the steps being taken by the bureau of mines and of standards to systematize, as far as practical, the composition of the different gasolines and grade them properly. If this can be done it will prove to be a benefit to manufacturer and car user alike.

DISCUSSION OF CARBURETION.

A. P. Brush:—Will Professor Berry state why the maximum power output is not coincident with the theoretically perfect mixture? Also, at what point in the enriching of the mixture does soot begin to appear on the spark plug?

Prof. O. C. Berry:—Two factors tend to enable the richer mixtures to give higher power than does the theoretically perfect mixture. In the first place the fuel is probably never quite uniformly mixed with the air, so that when the total air and gasoline are in proper proportion, some parts of the mixture are too lean. Then when a rich mixture is used the hydrogen tends to burn in preference to the carbon, leaving a deposit of carbon in the cylinder. The effect of this upon the power of the engine may be understood by analogy to the case where methane, CH_4 , is burned. To burn one cubic foot of methane requires 9.56 cubic feet of dry standard air, and will produce 1072 B.t.u. To burn the hydrogen out of two cubic feet of methane will require the same amount of air, but will produce 1392 B.t.u. Thus more power can be produced by the second method of burning.

My opinion is that the sooting is in almost exact proportion to the excess of fuel used, but that the effect in depositing carbon on the plugs will be much more noticeable when the mixture is rich enough to cause the engine to "miss" occasionally.

A. P. Brush:—All of us have seen engines that run in service and on the dynamometer without visible carbon deposit on the spark plugs. I would like to determine the point in the mixture at which discoloration from carbon begins to occur. It would then show us the practical running range of mixtures.

We might define the practical running range of mixtures as from the theoretically perfect mixture to that point when carbon begins to be deposited. It would be a valuable contribution if such a point be determined before Professor Berry's apparatus is dismantled.

USE OF LOW GRADE FUEL.

J. W. Esterline:—We have made an extensive investigation dealing with the use of low grade fuels in automobiles, and that part of the investigation which was assigned to me was the burning of fuels in the form of a gas, rather than in the form of a vapor. We ran several cars on kerosene and fuel oil, however, and had the novel experience of going around the speedway at 50 miles per hour on some crank case oil that a racing driver left in one of the cans in the pit.

We succeeded in obtaining a device that gave sufficient gas at a uniform pressure, at sufficiently low speed and at sufficiently high speed to operate the engine under practically all conditions of running. The device was simple, devoid of moving parts and could be regulated in an excellent manner. One

car was run 3200 miles and the cylinders were clean at the expiration of the test and appeared to be well polished inside. There was no residue left either in the cylinders or in the gas generators.

We had no difficulty in getting the mixture to ignite. There was no smoke and no smell. The engine efficiency was higher when running on gas mixed with air than when running on a vapor from a modern carburetor. On one test we selected a sample of gasoline with a given number of thermal units per pound and a sample of kerosene with the same heat value. The gasoline and the kerosene were both used in the same engine, the gasoline being admitted through a modern carburetor and the kerosene through the gas generator. Tests showed that the efficiency on the kerosene was from 15 to 20 per cent. higher than on the same engine running on gasoline and with the carburetor most advantageously adjusted.

In most of our work we utilized the exhaust heat from the engine for producing the gas. The only problem met was that of getting a production of gas at sufficiently low speed and an amount of gas proportional to the requirements of the engine at all times. This was successfully done, however, and the engine operated without difficulty.

The temperatures of the gas used were quite high, and our results showed that no doubt it would be necessary to design the engine to burn fuels at such temperatures.

We drove four different cars a total of 7000 or 8000 miles, and reduced the operation of the apparatus to a point where it was quite reliable. An engine running on a gas produced in this manner is powerful, snappy and flexible, and is at all times clean, provided the proper amount of air is mixed with the gas.

F. E. Moskovics:—Was any attempt made to analyze the exhaust for various mixtures?

Professor O. C. Berry:—They were not analyzed, as these chemical analyses require considerable time, which was not available.

HEAT IS BEST REMEDY.

V. R. Hettler:—Mr. Mock started his paper by recommending heat and small manifolds. The question of small manifolds is one that is very interesting. In our work we have found it advisable to have a ready means of determining gas velocities. We have found what we call the nomograph a convenient means of making calculations. This is based on the slide rule and the scales are slide rule scales. They are extended or contracted according to what exponent of the quantity is used and are shifted one way or another according to what factor is to be used in multiplying that particular quantity.

I do not know what Mr. Mock's idea of a small manifold is—that is, how small can it be? That is a matter of compromise, but I would like to know where in his opinion it is wise to stop. I suppose the gas velocities depend on the sort of manifold. With a dry manifold the size can be greater. A wet manifold must be a very small one if we want to get good action. We have found in our experience that heat is a remedy for most carburetion ills.

If heat is applied to the manifold, the mixture range can be much closer to the ideal of smaller range, or we have high power and economy. If heat is not applied the mixture is wet. If we do not want to adjust the carburetor constantly, we must keep the mixture rich enough so that the lighter elements will be present in large enough quantity to keep the engine running under all conditions. Heat will, therefore, help economy. It will have its effect on the condition that exists when the throttle is opened. If a manifold is heated, the wet condition described will not obtain to such an extent; on opening the throttle there will be more gas in the manifold. With a good manifold the throttle can be opened as quickly as desired and there will be no bark.

This explanation of what happens when the throttle is opened disposes of the wrong theory that for acceleration a rich mixture is needed. I believe Mr. Mock's explanation sets forth what we need. We may need more gasoline from the carburetor, but we need the same mixture in the engine. That we need more gasoline at the carburetor to keep the same mixture at the cylinder is due to the time necessary to pass from a dry to a wet manifold. This will not happen if the manifold is properly heated. With such a manifold and with one not too large, acceleration can be obtained without any sacrifice of economy.

Frederick Purdy:—In human affairs, spiritual and moral, it is said that any virtue carried to an extreme becomes a vice. It is true of engineering, which is largely a case of compromise, and adapting to conditions. There is no fixed rule that will apply to all. The carburetor man must make a thing as good as he can.

A manifold takes the mixture from the carburetor. We assume that the carburetor has delivered at the throttle, or a little back of it, a proper mixture for the load at which the engine is running. It is my impression that what we really want all the time is a theoretically perfect mixture or as near it as we can get. It is quite absurd to assume that the mixture that gives the highest mean effective pressure is the mixture that we want all the time.

There are many curves inside the manifold. We cannot make them straight and feed all the cylinders. They cannot always have an even rise and an even length. If the manifold is not uniform throughout its length, the gas velocities must change rapidly, no matter whether the car speed is accelerated or retarded.

Mr. Esterline called attention to the fact that in a carburetor or in any device he used he got higher efficiency. I at-

tribute that to the fact a gas was used. I saw some beautiful experiments made in Joseph Tracy's laboratory a couple of years ago on the burning of fuel oils; a portion of the oil was burned and the flame put out, but this portion raised the temperature of the remaining fuel to a point where a gas resulted, because the chemical composition of the material was changed.

NECESSITY OF ATOMIZATION.

It has been said that a vapor was intended to be used in the original combustion engine. I believe the original one was developed to use a manufactured gas. A vapor is substantially a gas in which the particles are exceedingly small; the smaller they are the more nearly possible it will be to carry them when air is not present. For the same reason, fine dust will float, because of its own surface tension and the quantity of air it carries on its surface; the finer the gasoline is broken up, the more it will be subject to the movement of the air. The larger they are the less subject they are to the movement of the air, so the more they will be affected by inertia. The best atomizing carburetor is desirable, largely for this reason. It seems to me. The finer the atomization the more nearly gas will respond to the changes air is subject to, and that is the crux of this situation.

I am not an advocate of extreme temperature, because I do not like to reduce the volumetric efficiency of the engine. In 1906, the bigger the engine, the better the car was considered to be, and the more we got for it, but conditions are different today. We use the smallest engine that will drive the car. The engine must be made just as efficient as possible. There is no advantage in reducing the volumetric efficiency in order to use gas at a high temperature. The economy will be higher when a higher temperature is used, because the gas will be vaporized and will be in almost a molecular condition.

We can only add a certain quantity of gasoline to the air and have it evaporate. That quantity at moderate temperatures is not sufficient to make a satisfactory running mixture so that a wet manifold is required. The object of a small manifold is to keep the speed so high that gasoline will be carried along the walls of the manifold at a uniform rate. The only reason for using a smaller manifold is because it is wet. It will not take up any more of the gasoline because it is running fast. If the air is passing fast enough over a body it will carry the gasoline along in small units, so that it will feed into the cylinder at a uniform rate.

The smaller manifold is not altogether the answer to the problem. I cannot say what the quantity of gasoline is that will be carried to the manifold in suspension. When the engine is cold the air going into it is colder and heavier. The volume taken in is not greater, but the weight is and it is pounds that count, not cubic feet. When the engine is cold more fuel is needed. The air weighs more so that the mixture is actually thin when it gets to the engine. In going over a mountain the volume of cubic feet of air is the same, but the air is of lighter weight and the fuel supply must be decreased to balance it. The situation is reversed when the air and engine are cold. If the manifold is smooth enough the mixture will be carried along the side more uniformly. Vents in the carburetor provide means for changing the speed of air slowly so that the inertia of the mixture will not stop it. If the mixture in the manifold is subject to changes in speed, and the elements are not thoroughly evaporated, the speeds must be changed so slowly that each element of the mixture can be kept up to the other. The heavy element will lag behind otherwise. In some carburetors this is taken care of with a dashpot and some take care of it in other ways. If the direction of movement of the mixture is changed less rapidly there will be a good deal less engine trouble. All the good engines that seldom miss are built with manifolds so that there is not such a rapid change in the speed or direction of movement of the gas.

MORE INTIMATE MIXTURE REQUIRED.

A. P. Brush:—We have been told manifolds should be kept small, so they can handle liquid; that they should be heated, so there will not be any liquid. Is one or the other, or a little of both necessary? We have been told manifolds should not have corners, because that would make the fuel separate from the air; that the corners, which we should not have, should be heated, so that the fuel will be evaporated. Is it all of one, or a little of both?

I would remind you, in analyzing this subject, it must be remembered that liquid fuel is never burned; that a gas is never burned. The only thing that is ever burned in an internal combustion engine is a mixture of one gas with another; some hydrocarbon gas combined with two gases, nitrogen and oxygen. After all, we are building gas engines, and all the fuel is gasified before it begins to burn, and is mixed with sufficient intimacy with the oxygen to burn.

My belief is that we should do everything possible to secure segregation as promptly as possible after the fuel leaves the nozzle. It should be secured before the first bend of the manifold has been met or at that point. Two forces can be used to induce segregation—one, inertia due to a change in direction of the flow, and gravity. A drop of liquid is affected by gravity and will fall out of the air stream if the velocity is sufficiently low. It seems to me, in place of trying to use small manifolds with few bends and putting the liquid into the engine and vaporizing it too late to secure a sufficiently intimate mixture with the air, so that it can all be burned, we should use this early segregation and throw the fuel into the air stream in the shape of a fixed gas. Thereafter each bend and every change in flow produces a more intimate mixture between gasified hydrocarbon and the air.

The question of supplying heat in connection with carburetion should be studied from the standpoint of what we desire to accomplish, which is the vaporization of the liquid fuel with the least possible addition of heat to the entire mixture.

The suggestion I make may and probably will prove to be the method of doing what we have been told we ought to do, but we have not been told how to do, namely, keep the density high enough to obtain good volumetric efficiency and not be in trouble winter or summer. If we can keep the air away from the vaporizing surface and make the fuel lie against that surface until vaporized, we are sure of a mixture which follows the flow of the manifold throughout its length and it is impossible to get too much heat into the mixture.

CARBURETOR SHOULD USE ALL FUELS.

I would like to raise the question as to whether a kerosene carburetor would be a desirable instrument if it could be secured. If we should originate a carburetor that would run on kerosene and would not run on gasoline I wonder if we would not reverse the present condition between kerosene and gasoline. Is not that carburetor and manifold arrangement which will handle a combination of all the non-viscous products of petroleum distillation the ideal device so far as petroleum derived fuels are concerned?

Frederick Purdy:—Some time ago a carburetor was developed in which the primary mixture was carried in a small tube that was heated alongside of which a great quantity of air was carried. This design did not prove to be very successful. I think Mr. Brush's idea is excellent and that it can be carried out successfully if we can find a way of doing it without having to use too massive a construction.

A. P. Brush:—My judgment is only that the manifold should be large enough. I believe that a horizontal portion of the header might be provided with a heated trough narrow and small enough to have small effect on the major air stream, but so located as to take care of any condensation of the gasified fuel. I doubt that any perceptible condensation would occur in the largest manifold with the lowest speed engine between the time of evaporation and delivery into the cylinders.

I believe the ponderousness of such a carburetor is not the problem of the carburetor man, but of the engine man. The former is through when he gives us an instrument that delivers a correctly proportioned mixture of hydrocarbon fuel and air. From there on it devolves upon the designer of the engine. All of the energy and money and time that the carburetor companies have spent in devising means for giving a temporary excess feed of gasoline to compensate for defective manifolds has been due to our neglect or misunderstanding of the problem; the carburetor designer has been forced by the engine designers to make his instruments less perfect than they were before that line of development was started.

VARIATION OF SUCTION.

C. P. Grimes:—I would like to substantiate Mr. Mock's statement regarding the variation of suction. On a recent hill climbing test, if the suction in the manifold fell below $2\frac{1}{4}$ in. Hg., we could not climb the mountain, regardless of the make of carburetor or the size of the manifold. In our case it resolved itself into the question of whether we wished to close the throttle or build a manifold with a choke of the proper size, thus necessitating a compromise with speedway performance.

V. R. Heftler:—One of the most successful airplane engines used in France not only has the heated manifold, but also has hot air introduced in this way: all the exhaust passes around the intake. The intake is in the centre of the exhaust muffler. At the high altitude at which these engines are designed to operate the temperature is so low that no heating arrangement can be too efficient.

A Member:—I would like to ask Mr. Brush if the gasified fuel will be precipitated out at 150 degrees if it has been mixed properly with the air, or if the affinity will keep the two in suspension in a saturated form. The mixture is precipitated out, but only the excess leaves as the air temperature changes. Is the temperature of the air in the manifold low enough so that the proper amount of gas to give a proper mixture will precipitate?

A. P. Brush:—Taking both air and fuel at running temperatures, there is not time enough to vaporize the fuel from the delivery at the jet to the ignition at the spark plug. The air in this room is probably so much below the saturation point with water at this temperature that it would take up a pitcherful of water. At the same time I might throw a glass of water into the air and the major portion of it, would come down. Some of it would evaporate, but a very small part. I might spread the same amount of water over a sheet of cheese cloth, spreading it over a large surface, and that cloth would dry and the water would be in the air. There is no question that the time is too short for natural evaporation to diffuse the fuel. I am sure that even if the air is given heat enough, in time, to vaporize the fuel, it does not get to the fuel fast enough and that considerable size drops of fuel pass into the engine as such.

F. C. Mock:—The subject of carburetion is so broad and practical in every detail that it is hard to tell where to start. Our present engines have not changed from the original design, which was intended to operate on gasoline vapor and air, but the fuel available has changed so we cannot always have gasoline vapor. I think that a great part of our trouble with engine operation is due to inefficiency in the gas charge. When we do not have proper fuel the engine does not run right. When particles gather in liquid form we cannot further control the flow, regardless of the care taken in design.

Motor Costumes For Early Season Tours

TO THE smart Printzes motor coat of tan velour on the left, broad box pleats lend an attractive feature. The one on the right, fashioned in brown velour, has a triple belt as a distinctive feature, and both have the attractive convertible collar. Both models were tailored by Bonwit, Teller & Co.



The one-piece frock, in the centre, contrived by Franklin Simon, displays a combination of plain and cross-bar khaki-cool. Rose and white forms the color combination, the plain material being used in the sport-like bodice.

A motor coat fashioned entirely in rough tussah is one of the United Fashion Co. features. The model on the left is one in gold and brown, with box-pleated back, deep box-pleated pockets with lapel top, featuring confinement at the waist line with belt of self material.

A Printzes motor coat of black and white check, seen at the right, appears in some extremely smart Bonwit, Teller & Co. models. A double belt, pointed pockets and convertible collar are distinctive, while novel buttons and silk stitching lend an attractive finishing note.



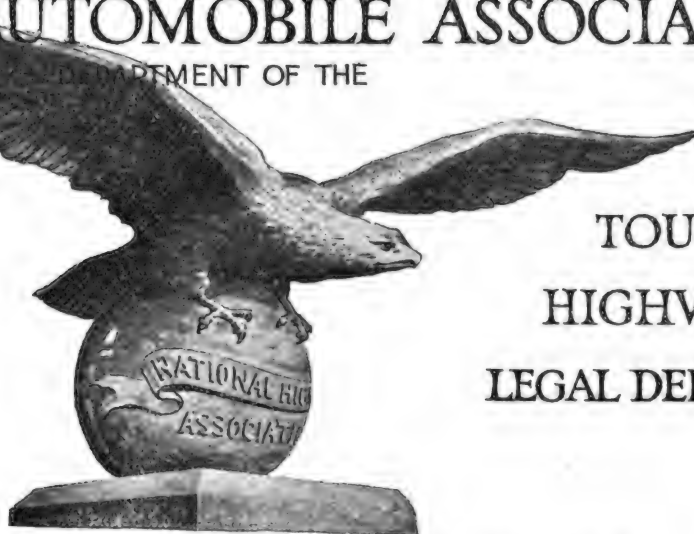
Photos by Joel Feder, N. Y.

OFFICIAL JOURNAL OF THE NATIONAL AUTOMOBILE ASSOCIATION

DEPARTMENT OF THE

NATIONAL
HIGHWAYS
ASSOCIATION

TOURING
HIGHWAY
LEGAL DEPTS.



9 PARK STREET, BOSTON, MASSACHUSETTS

SEE AMERICA FIRST AND FIRST OF ALL SEE NEW ENGLAND

"SEE America First" usually is intended to mean go West, instead of to Europe. But should it mean that only and why does it now only mean that? Obviously because concentration of wealth goes with density of population, and this means a larger leisure class having time and money enough with which to travel for pleasure.

The northeastern section, New England, has more of this kind of population to draw from than have other sections. Why has this class gone to Europe instead of West? Has it been entirely because of the greater historic interest of old countries? The greater beauty and permanency? The variety of speech, manners and customs? Or has the root of it been the greater facilities for comfort in traveling? Or a combination of all these elements? Wellington, the great authority on railroad location and operation, gave most conclusive data to show the enormously favorable effect of convenience and comfort on passenger travel.

The advent of electric street railways with the "leave at your door" service produced a passenger movement unattainable by the less convenient service of the steam railroads. Fine stations, first class rolling stock, substantial road bed, cleanliness, rapid, regular and frequent service, are all most important contributing causes inducing travel and its repetition where it would not otherwise exist.

The railroads of England and Continental Europe have established their own hotels to add to their railroad revenue. Amusement resorts have been created for the same purpose. The bulk of tourist traffic is created not by the merit of what is to be seen so much as by the skill and extent of its advertisement, and the comfort and convenience of getting to the objective point and while there. The cost of the trip is likewise an important consideration. Motoring through Europe is far less expensive per locality seen and miles covered than many people spend traveling via rail. Not that motoring is the least costly by any means. Walking is cheaper, but you see less in much more time. Lakewood, N. J., is no better than Lakehurst, a few miles away, except for convenience and comforts. Colorado Springs is no more delightful or advantageous than Manitou Junction could have been were the comforts and conveniences there.

Some Centres Favored.

This is also shown by the fact, of which most of us know specific examples, that railroads have discriminated in favor of certain centres at the expense of other localities. How was this done? Better rates, more frequent and rapid service for freight and passengers and greater convenience and comfort for the latter. The same relative difference that exists between our eastern shores and Europe exists in comparing our West

with our East. Furthermore, we in the East came from Europe. The latter is our old home of years ago, before many of us were born. For the West to go East is likewise going to the old home of ancestry. It is easier to travel East than to travel West—that is, for pleasure or association, and sometimes for business—more people go East than the reverse if one does not count them returning westward! Why is it easier? Essentially increased comfort and convenience and that which goes with it, reduced cost.

On the other hand there is no reason why "seeing America" should only mean going West. The East should not be passive and indifferent about it. The East should cater to the traffic which it can induce from the West, just as much as the West now tries to cater for eastern traffic. We have an Atlantic shore and summer climate that the West cannot elsewhere secure. We should copy Europe, and get busy for the business the West is more than ready to give us. They would see and like Niagara, the Adirondacks, White mountains, the lakes and woods of Maine, the shores of Cape Cod and Florida, if we bestirred ourselves and made them feel at home and that they were wanted. They do all this for us. So does Europe. Why do we not reciprocate?

Now roads and their use are governed by the same fundamental laws as any other method of intercommunication. The more frequent, the more convenient,

the more economical they are the more they will be used, and the more useful to the greatest number of people. Strange that any community should oppose the building of a good road! And yet some do. But stranger yet is their opposition to another good road within easy distance of the one they originally opposed just as soon as they get that which they originally did not want. But then many people oppose most things. Trolleys were fought by the steam railroads. Telegraph companies fought the extension of telephones. Both fight wireless. Gas companies opposed electric lighting stations. Workmen resist the introduction of labor saving devices that really increase the ways in which labor can be used. And yet all these new improvements fill their own field and furthermore increase the use of those utilities the owners of which fear will be displaced.

In the following issues of the journal an effort will be made to induce westerners and southerners and all other 'ers' to see the beauties of the Green mountains, the White mountains, the lakes and the woods of Maine, the shores of Cape Cod, and the scores of wonderful sand beaches, besides thousands of beautiful places and things of artistic and historic interest which makes New England pre-eminent by presenting some of the most picturesque motor tours yet formulated. In the meantime let the slogan be—"If you cannot tour Europe, tour New England."

MORE LAW WORTH REMEMBERING.

We advise our members at no time to put out their lights while their car is standing on the streets, though it may be in a locality where there is much illumination. While the law is not specific on this question in such a manner as to be readily interpreted, yet the attitude of the Massachusetts Highway Commission and of other officials has been that a car is being operated when it is upon the highways, regardless of whether or not the engine is running or the brakes set. **Keep Lamps Lighted.**

If this view point be a correct one and sustained by our courts it would mean that a car left on the highways, without lights and carelessly run into by another vehicle, the owner of the damaged car would have difficulty in collecting damages. Not only must that phase be taken into consideration, but also the fact that the motorist might be subject to a criminal prosecution for failure to display lights. While there have been few arrests for this cause, namely, failure to keep a car properly illuminated, yet it is the attitude of the police authorities that such a failure constitutes an offense against the motor vehicle laws.

Failure to Observe Before Deflecting or Stopping.

In an action for damages resulting from an automobile collision, evidence that the driver did not look before deflecting his course in the road, where he should have expected automobiles, or give a warning signal to motorists fol-

WANTED

NATIONAL AUTOMOBILE ASSOCIATION REPRESENTATIVES.

At the big automobile show, recently held in Boston, an intelligent and shrewd business man, after glancing at one of the placards displayed at our booth, hurled this at us:

"Eighty dollars for five dollars! Why that's 1600 per cent. return upon your investment. Show me."

We "showed" him; and this is what he said:

"Don't be so modest. You can raise the percentage even higher. Why don't you let people know what you can do for them?"

This remark encourages us to state here that we want representatives in every important motoring centre to "show" motor owners what it would mean to them to become members of the greatest motoring organization in the United States.

Never before in the history of the National Automobile Association has there been such an increase in its membership as has taken place during the past three months, and more especially during the week of the Automobile Show recently held in Boston. The bigger the association the bigger its influence, for organization is the very keynote of modern life, whether in the home, the shop, in the field, or on the road. Therefore, we urge all the readers interested in motoring or good highways to write for our maps and publications. It will profit you to write us.

lowing him, a verdict against him could not be said to have been unauthorized. **Automobiles Passing Schoolhouses.**

In passing schoolhouses, which children are attending, motorists are expected and required to move at a reasonably moderate rate of speed. Both courts and juries look with disfavor upon fast driving in such places. Aside from the law a proper regard for the welfare of the children would seem to compel, in all decency, extraordinary care in driving in such places.

About Killing Dogs.

We often hear of cases where some unfortunate owner is called upon to pay damages for running over a dog which chanced to cross his path; but we now find a motorist recovering for damages to his machine caused by a careless or negligent dog. The learned court before which the case was tried said that the testimony of the owner of the automobile showed that as he was driving his machine along the public highway, in the exercise of reasonable care, the defendant's dog suddenly jumped directly in front of his car and so quickly that the driver had not time to apply his brakes before it struck him. The left hand

wheel, which struck the dog, jacked the machine around and drove it across the ditch, tipping it over. Therefore he was entitled to damages.

Use of Cut Out.

Where the driver of a motor vehicle had no horn upon his car (it having been removed for repairs) and he used the cut out in order to sound a warning, a New York court has held that negligence was not established in proving that a municipal ordinance forbade the use of cut outs.

Loaning Automobiles.

If the owner of an automobile loans or permits another to use it for a purpose in which he has no interest, the owner cannot be held answerable for any injury resulting from carelessness in its operation. The owner can be held liable only on the ground that the person borrowing the car was acting as the owner's agent at the time.

Failure to Sound Horn or Give Signal.

Where a pedestrian knew of the approach of an automobile some 600 feet distant and turned out of the road in ample time, a court has held that the proximate cause of the injury the pedestrian sustained could not have been due to failure to sound the horn.

Automobiles Like Other Vehicles.

In the absence of special regulations automobiles are governed by the same rules of the road as apply to other vehicles.

Re Hired Mechanics.

Where a mechanic was called in for a few hours to repair an automobile he did not become a servant through such employment of the temporary employer under the employer's liability act of New York.

SPLASHING THE PUBLIC.

While the "muddy season" is with us more or less all the time, it will soon be on us in earnest, and all motorists using the highways should in all possible ways avoid splashing the public. Too little regard in this respect is given to the rights of people who use sidewalks and street crossings by many operators and chauffeurs driving motor vehicles. This splashing of mud, however, is often unavoidable; but this fact does not lessen the duty of all motorists to exercise the greatest care to prevent annoyance, discomfort and sometimes the ruination or soiling of pedestrians' clothes by these mud showers.

RUM AND GASOLINE.

These two liquids do not mix. We make known this fact to motorists who imagine that they do. We also desire to state that this association does not in the least sympathize with drivers of motor vehicles who use the highways, while under the influence of rum, in any form or degree; and that our attorneys are instructed to refuse the defense of drunken motorists. We make reference to this matter here and now for the purpose of urging motorists during the coming touring season to "cut out" the use of liquor while driving their cars, not for their own safety alone, but for the safety of others as well.



Federal Road Commission Suggested

IN VIEW of the recent congressional appropriation of \$75,000,000 to assist the states of the Union in the construction of post and military roads, the expected expenditure of the states during 1917 of about \$400,000,000 and the consequent enormous impetus given to the road building movement—the greatest this nation has ever experienced—it may be of interest to the readers of this journal to know what the National Highways Association is seeking to accomplish aside from educating the American people to know the necessity and advantage that exists for good roads everywhere.

There are about 2,300,000 miles of public highways outside of municipalities in the United States. In 1914 there was expended for the construction and maintenance of the highways \$200,000,000. It is estimated that in 1917 about \$400,000,000 will be expended. By a conservative estimate one-quarter of this sum is wasted.

LOCALIZED AUTHORITY.

Of the 48 states some 38 of them have highway departments. There are over 3000 counties in the various states. The county and township highway work is in the hands of 100,000 highway officials. The 12,000 municipalities in the United States each has from one to 20 officials in charge of departments whose work pertains to highways.

In these states, counties and towns not over five per cent. of the highway officials possess the training and experience necessary to efficiently and economically perform the duties imposed upon them. With reference to municipalities and incorporated villages, the percentage may be increased to 25. The chaotic conditions and waste of public funds indicated by the above facts may be attributed primarily to three factors; first, too intimate relationship between politics and highway work; second, the attitude of the public; third, the status of

the engineer in public life.

In view of these facts it would seem of prime importance that a most thorough study of the question be made by the government before any definite policy be adopted or appropriations voted either in the nature of federal aid to the states or for national highways.

While the National Highways Association has made a deep study of the subject, and at a great expenditure of time, energy and money has prepared a tentative plan of a great system of national highways, yet the association, nevertheless, believes that neither its plan nor any other plan should be determined upon until after a thorough and painstaking study and report by a government commission appointed by the President. Such has been the policy pursued in connection with all other great government projects, including the Panama canal. Should it not be the same with roads—the greatest and most important undertaking of all?

With this object in view the National Highways Association has drafted the following bill, which it commends to the serious consideration of all persons interested in national highways and good roads everywhere:

A Bill to Create a National Highways Commission and Prescribing Its Powers and Duties.

Be it enacted by the Senate and House of Representatives of the United States of America, in Congress assembled:

Section 1. That a commission is hereby created to be called the "National Highways Commission," to investigate, collect information and report to Congress on the highways of the United States, together with recommendations as to the proper policy of the national government in respect thereto (whether by the establishment of a system of national highways or by federal aid in the building of state roads or otherwise), and as to the most appropriate legislation to carry such policy into effect.

Section 2. That the National Highways Commission shall consist of a chairman as the executive head in responsible charge thereof and 13 additional commis-

sioners as an "Advisory Council."

Section 3. That the President, by and with the advice and consent of the Senate, shall appoint said commission as follows:

First: That the chairman shall be or have been an engineer by education and profession and shall be a man of executive and business experience.

Second: The chairman shall be selected from candidates nominated to the President, one by each of the following associations:

(Such as the American Society of Civil Engineers the American Automobile Association, the American Road Builders' Association, the National Grange, Farmers' Union and any other representative national associations especially concerned with highway development. In this section should also be suitable provision for the manner of making such nominations.)

INTERESTS ON BOARD.

Third: The 13 members of the "Advisory Council" shall be respectively qualified to represent the following interests in the body politic: (1) Agriculture, (2) Commerce, (3) Construction, (4) Economics, (5) Education, (6) Engineering, (7) Finance, (8) Legislation, (9) Maintenance and Traffic, (10) Materials and Machinery, (11) Military, (12) Transportation, (13) Travel, Touring and Recreation.

(This enumeration is merely tentative; the intention being to name all of the general interests of the country which are directly concerned in the development of a system of national highways.)

Fourth. Vacancies occurring in the commission shall be filled in the same manner as hereinbefore provided for original appointments.

Fifth. Any member of the commission shall be subject to removal by the President for inefficiency, neglect of duty, or malfeasance in office.

Section 4. That the chairman shall receive a salary of dollars per annum and each other commissioner a salary of dollars per annum.

Section 5. That the powers and duties of the chairman shall be:

(In this section should follow an enumeration of powers and duties in sufficient detail to indicate the extent to which the commission is required to investigate and to give the chairman the fullest possible power to carry out such investigation. The following points in particular should be covered:

- (1) Executive direction of work.
- (2) Appointment and removal of employees.

- (3) Providing offices, laboratories, etc.
- (4) Collection, tabulation and publication of information; including experimental work, surveys, etc.
- (5) Obtaining information and cooperation from governmental departments.
- (6) Incurring necessary expense.
- (7) Preparing and submitting a complete final report with recommendations.

Section 6. That the duty of the "Advisory Council" shall be to assist the chairman as he may direct and to advise with him at his request or on their own initiative.

Section 7. That the term of office of the commissioners and their successors appointed hereunder shall end upon the delivery of their final report to the President, but not later in any event than 19....

Section 8. That for the purpose of carrying out the provisions of this act, there is hereby appropriated the sum of dollars, out of any money in the treasury not otherwise appropriated.

Section 9. That this act shall be known as the national highways act; and shall take effect upon its passage.

This bill follows the precedent which has proved so successful in the case of the Panama canal, in concentrating the authority and the responsibility of the commission upon a single capable man, carefully chosen, subject to removal for cause, and ably supported by an "Advisory Council," representing all the various activities of our national life. It aims to gain complete and reliable information within a reasonable time as a basis on which to determine a policy and to frame the proper legislation. It recognizes the value of publicity and the importance of evoking discussion in the press and of crystallizing public opinion.

CONNECTICUT MOTOR LEGISLATION.

The Legislature of Connecticut has now before it all the motor vehicle bills that are likely to be presented to it during the present session. These bills, with the recommendations contained in Governor Holcomb's inaugural address, may be summed up as follows:

First. Heavier penalties—jail sentences in most cases—in the case of negligent drivers of motor vehicles, with especial severity shown towards those who drive while under the influence of intoxicants.

Second. More stringent examinations of applicants for drivers' licenses, and more restrictions upon the return of licenses to those who have forfeited

them.

Third. The creation of the office of commissioner of motor vehicles, and the placing of all matters pertaining to automobiles under his supervision, removing such matters from the domain of the secretary of state—as was recommended

in the Governor's message.

Fourth. Further restriction of the employment of glaring lights upon highways.

Fifth. Fixing a limit to loads that motor trucks may carry upon the highways of the state.

The Great "Burlington Way"

The progressiveness and universal interest of the National Highways Association in good roads everywhere is seen in the further development of the great "Burlington Way," which connects St. Louis with Chicago—a distance of 303 miles—and the present agitation on foot to decide whether Southern Illinois shall have this national highway from St. Paul, Minn., to New Orleans, La., or whether it will be located on the west side of the Mississippi river. Meetings are now being held to determine this question.

For the information of the people of the Atlantic seaboard it may be said that justifiable claim is made that the "Burlington Way" is the best marked and maintained trail in the United States. Its orange and white markers lead the motorist through 200 towns, over 1700 miles of the "best marked trail in the world," connecting Springfield with St. Louis, Chicago and St. Paul, Minn.

This way has not only attained a nation wide pre-eminence for itself, but has also had the result of carrying its "Father" into the position of director general of the "International Pavedway," another creation of the National Highways Association, which is to run from Laredo, Tex., by way of San Antonio, Austin, Fort Worth, Dallas, Texarkana, Little Rock, St. Louis, Springfield, Decatur, Danville, Fort Wayne to Detroit, Mich.

In the month of May next a huge, beautiful, substantial and brilliantly colored marker will be erected and dedicated at a place 53 miles north of St. Louis and three miles north of Medora. The standard will be of solid steel, weighing 1500 pounds, 12 feet high and 4½ feet across.

It will stand at the head of the road where "Burlington Way" parts from "Alton Way." At the crest, if it can be arranged, will be the golden eagle of the National Highways Association, and then directly beneath this inscription, "Burlington Way Division of the National Highways Association."

The marker is being made by the Lebanon Machine Works at Lebanon, N. H., and its erection will mark an innovation in the West. It will be the first thing of the kind put up on this continent outside of New York.

Legal Notes

RIDING WITH DRIVERS UNDER THE INFLUENCE OF LIQUOR.

The negligence in driving an automobile when not in a condition therefor (such as being in an intoxicated condition) constituting a contributory cause of a collision with a railroad train, cannot be imputed to an invited guest, unless it was known to the guest when he got into the car, or when he remained therein after he discovered the driver's condition.

AUTOMOBILES LIKE OTHER VEHICLES.

In the absence of special regulations automobiles are governed by the same rules of the road as apply to other vehicles.

The mere fact of the skidding of an automobile is not evidence of negligence.

TRAPS

WE ARE advised by the officials of a number of municipalities that with the beginning of the touring season the automobile laws of the New England states, especially, will be quite strictly enforced. This step becomes necessary because the enormous increase in the number of motor vehicles using the highways will have to be more carefully regulated than heretofore to insure not only the safety

of the general public, but of the hundreds of thousands of people who make up the motoring public.

The following are a few of the municipalities and departments which last year deemed it necessary to penalize violators of motor vehicle laws and which may be counted upon to carry on the work during the forthcoming automobile touring season.

MASSACHUSETTS.

New Bedford	Fall River	Adams
Somerset	Webster	Salem
Beverly	Boston	Springfield
Worcester	Newton	Arlington
Brockton	Agawam	Winthrop
West Roxbury	Wollaston	Watertown
Groton	Norwood	Wellesley
Milton	Holyoke	Gloucester

Metropolitan Park System.

Lebanon
Canaan

Hartford
Stamford

Portland

Providence

NEW HAMPSHIRE.

Concord
Dover

CONNECTICUT.

New Haven
Fairfield

MAINE.

Old Orchard Beach

RHODE ISLAND.

East Providence
Newport

Entry Blanks Out for Classic

Purse of \$50,000 Offered for the Great Middle Western Memorial Day Race at Indianapolis

The officials of the Indianapolis Motor Speedway have sent out entry blanks for the 500-mile race at Indianapolis on May 30 for a purse of \$50,000, one of the largest purses ever offered for an automobile contest.

Last year the classic at Indianapolis on Decoration Day was a 300-mile event, but the officials after feeling the public pulse decided that it was not as popular as the 500-mile events that had been held in previous years, consequently it was decided to make this year's event for the latter distance.

T. E. Myers, general manager of the Indianapolis track, says that nothing can happen to prevent the running of this year's event and that it will prove one of the greatest auto derbies ever held, as assurance has been received that the majority of the American stars will enter, as well as the best known European drivers.

Word has been received from the English Sunbeam factory that Louis Coatalen, chief engineer of the Sunbeam Motor Co., has accepted the proposition submitted by the executive committee of the American Speedway Association, which met in Indianapolis recently, and would send two cars to America. No information was given out regarding this offer, although it is understood that a substantial financial inducement to defray traveling expenses was made. It is expected that Eddie Rickenbacher will pilot one of the cars and Josef Christiansen the other.

Ralph De Palma has announced that he will enter and drive his Mercedes, which has been built over in his Detroit factory, and also the Peugeot that he recently purchased from Lutch Brown. He has arranged to get some new parts for the car, although has not decided who will drive it.

As to racing in general for the approaching season, the stringent regulations of the contest board, coupled with the advances made by the manufacturers in motor car construction, have already reduced the possibility of accidents, so far as the cars are concerned, to the very minimum. What improvements the manufacturers will show on their cars for 1917 will add still more to this great factor of safety.

There is no speedway where accidents did occur in 1916 that has not taken steps to remove the old dangers.

The frankness of James Allison, one of the owners of the Indianapolis Speedway, and the Prest-O-Lite Co., in discussing the speedway question at the A. A. A. dinner in Chicago, is to be much admired. In touching upon the accidents during 1916 he felt that like everything else of any magnitude, the speedways had to have their beginning, and again like everything else, these beginnings

were intermingled with, in most cases, serious accidents. These accidents may be attributed to many causes, but it is certain that the speedways are correcting their defects as quickly as they are discovered. At Indianapolis the management is taking time by the forelock and those who attend the races there this year will find a number of improvements that further insure the safety of the drivers as well as the public.

One of the valuable portions of Mr. Allison's talk was when he referred to the hotel conditions of previous years at Indianapolis. Those who have attended the races there remember that hotel tariffs were increased to unreasonable proportions during the racing season. But Mr. Allison has been the cause of remedying this, for he threatened, and needless to say, would have made good, to



Headliners for Indianapolis.

take the 1917 events away from Indianapolis and run them on other speedways unless the hotel managements would be satisfied with their regular charges during the time when so many people flock to the Indianapolis races. When the hotel men acceded to his request, the most serious obstacle that has confronted the speedway management was removed.

DISTRIBUTORS FOR DOBLE CARS SIGNED.

The General Engineering Co., Detroit, Mich., makers of the Doble steam car, have signed with the following distributors: Pacific KisselKar Co., San Francisco, and E. C. Thompson, Minneapolis, Minn. The Pacific KisselKar Co. will handle the Doble on the Pacific Coast and the Thompson Company, which has 175 sub dealers, will cover Minnesota, western half of Wisconsin, North and South Dakota and all of Montana east of the Rockies.

PERLMAN BRINGS SUIT AGAINST FIRESTONE.

The Perlman Rim Corp., New York, which controls the Perlman demountable rim patents, has brought suit against the

Firestone Tire and Rubber Co. of Akron, O., in the United States court at New York, claiming infringement. A perpetual injunction is asked for, also a preliminary injunction pending the settlement of the suit and an accounting of profits and assessment of damages and a trebling thereof and back royalties.

METZ COMPANY MAKES 100 CARS A DAY.

Production at the Metz factory in Waltham, Mass., has been placed on a schedule of 100 cars a day to meet the steadily increasing demand for these serviceable automobiles which are now the lowest priced, fully equipped machines sold in the world.

Sales Manager Roscoe A. Pickens, in speaking of the big boom in the demand for Metz cars since the price was reduced \$55, says:

"I expect this year will be the biggest in the history of the Metz company, and we are prepared to meet the demand, no matter how large it becomes. This new Metz model is a phenomenal mechanical creation, the result of the genius of Charles H. Metz. He built this new model a year ago for his own use. He tried it out. Made improvement after improvement and gave it to his engineers to take long trips in until every criticism was met and remedied and it suited him—suited Charles H. Metz. Nothing but the best would he permit to bear his name. That is why this 1917 car is considered such a wonder.

"But best of all is the success of Mr. Metz in making this latest model the real economy car. Repeated tests have shown 25 miles to the gallon of gasoline. Some of the cars have made more than 30 miles to the gallon, but we only claim 25 for it. Considering that after buying the machine the owner needs no further equipment, and that the price is only \$545, the Metz is the best dollar for dollar buy in the world and has the lowest upkeep cost."

NO MATERIAL SPECIFIED IN FEDERAL ROAD ACT.

The secretary of agriculture has sent out a notice to the effect that no restrictions have been placed on the kind of a highway that may be built under the Federal Aid Road Act, which appropriated \$85,000,000 for the construction of roads throughout the United States. The notice says: "This department, which is charged with the administration of the Federal Aid Road Act, has placed no restrictions, either direct or implied, upon the kinds of highways to be constructed."

MAY RECOMMEND GASOLINE STANDARD TO CONGRESS.

The Federal Trade Commission, which recently investigated the general gasoline situation, may include in its recommendations to Congress the adoption of a gasoline standard to prevent the fraudulent practices that it is alleged are common in some sections of the country.



Accessories and Equipment



AUTOMOBILE GAUGES.

The U. S. standard dash board sight feed oil gauge shown in the accompanying cut has a heavy cast case and ring. The flanges are cast solid to the front part of the case, permitting it to be mounted practically flush on the dash. The interior of the case is finished in white enamel. This gauge matches in sizes, shape and finish the company's 1913 design automobile pressure gauges and can be mounted with the other, retaining a uniform and elegant finish on the dash. They have standard connections: One-eighth inch female pipe thread on the inlet and one-quarter inch on the outlet.

Manufactured by United States Gauge Co., 67 Wall St., New York City. Price with two-inch dial finished in brass, \$4; nickel finish, \$4.60.

RELIABLE FIRE EXTINGUISHER.

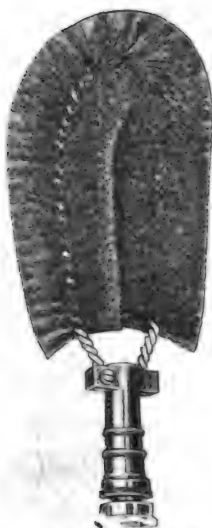
The Reliable fire extinguisher is adapted for use in all kinds of fires where the quick use of an extinguisher prevents great loss. It is simple in operation and is a non-conductor. The maker asserts that it will not explode or corrode and will throw a stream 30 feet. Its adaptability under all circumstances makes it efficient for extinguishing acetylene, electrical, gasoline, naphtha, oils and varnish fires in either private homes, factories, stores, warehouses, automobiles and motor boats. The extinguishers are made of hard brass in four sizes, as follows: Baby size, one pint, \$7; auto size, two pints, \$8; motor boat size, three pints, \$8; large size, six pints, \$12.

Manufactured by J. W. Stevens, Rosebank, N. Y., and distributed by Charles D. Durkee & Co., 2 and 3 South St., New York City.

NAME ON ROBE.

The "Name On" auto robe is a distinctly new departure. It is made of extra long fiber mohair and is luxurious, durable and warm without being bulky or heavy. It is bound with felt and sewed with three rows of stitches. The robe is reversible, having different colors on each side. The special feature of this robe is the woven-in name. The owner's initials or name is woven in the robe and cannot be removed without destroying the robe. A number of different color combinations are offered.

Made by Wright "Name On" Robe Co., 27 Sherwin St., Waterville, Me. Prices from \$10.50 to \$15, according to size.



Fuller Fountain Brush.



Reliable Fire Extinguisher.



Wagner Engine Cleaner.



Racing Seat.



Automobile Gauge.

WAGNER ENGINE CLEANER.

A simple device for keeping an engine clean, which is operated by six pounds air pressure, is illustrated. The makers claim that this device enables one to clean places that cannot be reached in any other way, and that one quart of kerosene will clean any size motor. The passage of the air through the cleaner head carries the kerosene with it in the form of a spray.

Manufactured by Wagner Specialty Co., 18-20 West 63d St., New York. Price upon application.

RACING SEATS.

Now that old cars are being remodeled for racing, it is a good time to consider the matter of seats. The Three A Co. racing seats illustrated are attractively finished with black upholstery of good substantial imitation leather, known as mule skin, which has excellent wearing qualities. The cushion is made of the same material stuffed with curled hair. The shell of these seats is made of heavy gauge automobile steel, attached firmly to a wooden bottom seat, and braced with strong angle irons. It is primed to prevent rusting.

Manufactured by American Automobile Accessories Co., 621 Main St., Cincinnati, O. Price, \$15 per pair.

FULLER FOUNTAIN BRUSH.

The Fuller fountain automobile washer brush, shown in our illustration, is a solution for the old sponge and hose combination. As fast as the dirt is loosened by the brush the water from the nozzle washes it away. The flow of water through it may be regulated from a gentle spray to a straight, forceful stream. This brush is made in three grades, No. 94 of high grade China bristle, No. 94A of Palmyra fiber, and No. 94B of soft cotton. The three grades are interchangeable.

Manufactured by Fuller Brush Co., 74 Union Place, Hartford, Conn. Prices as follows: No. 94 with nozzle, \$2; Nos. 94A and B, 50 cents each.

AUTOMATIC VOLTAGE REGULATOR.

The Aske Automatic Voltage Regulator is intended to fill a long felt want with the owners of Ford cars who have had trouble with their lighting systems owing to their inability to control the current, which varies in accordance with the speed of the engine.

The Aske regulator, which is attached to the dash board under the hood, is connected in the circuit between the magneto and the headlights and works automatically. It has no moving part; it is not a storage battery nor does it require any oiling, refilling or cleaning. It also permits the use of lamps of any voltage and from six to nine volts and 12 to 15 candlepower. A dimmer may also be incorporated in the regulator as well as a tail light. With the use of this device the system is said to give ample light in all driving conditions and prevents premature burning out of lamps due to excessive voltages. They can be used on Ford cars that are numbered above 565,155.

Manufactured by Aske Automatic Voltage Regulator Co., 307 Providence building, Duluth, Minn. Price, \$5 each; dimmers, \$1 additional.

PERRY AUTO LOCK.

A new method of locking automobiles is introduced by the Perry auto lock. This device is contained within the steering wheel spider on some cars, while on the Ford it is installed on top of the steering column housing. When the bolt is opened by the key, the steering wheel lifted about half an inch and the bolt pushed home again, the steering wheel is entirely disconnected from the steering post, making it impossible to tow the car away, as the front wheels run wild. The Perry lock is made for all cars and the manufacturers claim that it cannot be picked.

Manufactured by Perry Auto Lock Co., 1238 Michigan Ave., Chicago, Ill. Distributed by H. & H. Motor Specialties, Inc., 755 Boylston St., Boston, Mass. Price for Ford car lock, \$5. Other prices upon request.

PERFECTION RIM TOOL.

We give on this page two illustrations of the Perfection Rim Tool, a handy little device for the man who has to change tires which are mounted on split rims. The tool is adjustable for all sizes of rims and the operation is very simple and rapid. The hooks are locked over the edge of the rim about four inches from the rim lock, then the lever is swung backward until it touches the rim. By this operation the tire is released.

Manufactured by the A. & A. Co., Minneapolis, Minn. Price, \$2.50.

MOTO-FAN RADIATOR COOLER.

The Moto-Fan radiator cooler incorporates a very novel application of the principle of maintaining a normal operating temperature in the cooling fluid of the radiator. The device is formed of a hollow tubular ring with a four-bladed fan set in the centre on an upright support. It is screwed into the radiator cap in a threaded hole made for the purpose and makes a semi-circular passage way from the top of the radiator for a distance one-quarter the way around the ring on either side, and opening on the inner side



Moto Fan Radiator Cooler.



Clark Realite Regulator Box.



Perfection Rim Tool.



Curtain Light.



Perry Auto Lock.

of the ring and close to the field of the fan blades. The fan is caused to rotate by the motion of the car and the whirling action set up in the air sucks out the steam and heated air from one orifice and forces in clean, cool air through the other, thereby tending to maintain an even temperature in the radiator, as with the increase of speed of the car the fan is accelerated proportionately.

Manufactured by the Art Metal Works, 15 Mulberry St., Newark, N. J. Prices, \$2.50 and \$3.50, according to size.

THE CLARK REALITE.

Designed for the Ford car, the Clark Realite is a new device by which the headlights are automatically regulated. It connects in the lamp circuit and the regular Ford bulbs are removed and special bulbs substituted. The lamps are connected in multiple. With the engine running at low speeds, practically all of the current from the magneto is passed to the lights. As the engine speed is increased a part of the current only is used for the lights, the balance being held back by a specially designed impedance coil. This device permits a steady light from both headlights at all engine speeds without the danger of burning out bulbs.

Manufactured by Hilton & Burks, Texola, Okla. Price, \$5. Jobbers and dealers are requested to write for details.

CURTAIN LIGHT.

The Gordon Curtain Light is equipped with special fasteners for applying it to the curtain on the back of the Ford car should it become broken. It is not necessary to take the rear curtain off when this light is used.

Made by the J. P. Gordon Co., Columbus, O. Price, 80 cents.

SPARK PLUG TESTER.

In order that an engine may run well and give its maximum power the spark plugs must be in the best of condition. The Perkins spark plug tester is made for the purpose of locating faulty spark plugs, and for setting the spark gaps in all plugs so that they will be in "tune." The tester is made in two colors, black and red, neatly finished and of high grade insulate composition.

Manufactured by A. D. Perkins, 1777 Broadway, New York, N. Y. Price, 75 cents.

PECO IGNITION PLUG.

It is frequently desired to use a double ignition system on a single system magneto. This is impossible with ordinary single ignition plugs, but the result may be attained by the use of a double ignition plug. Such a plug is the Peco. It is



Spark Plug Tester.

designed to be connected with a regular single ignition plug and when so attached the secondary current passes through it to the regular plug and thence to the ground, furnishing two firing points in the cylinder.

Manufactured by Power & Efficiency Co., Trenton, N. J. Price, \$1.50 each in brass and \$1.25 in steel.

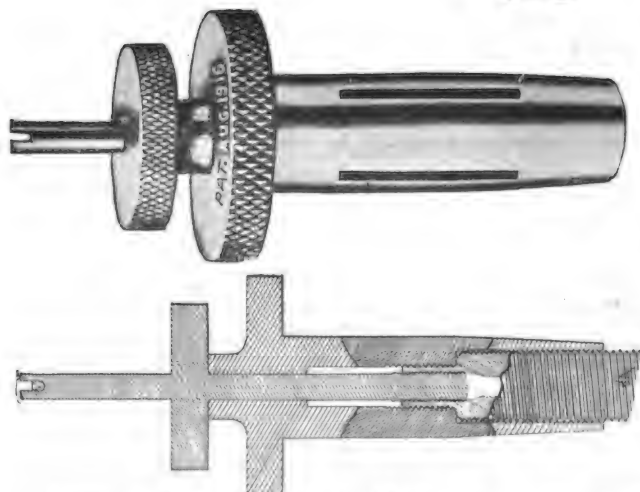
DETROIT CARTRIDGE LOCK.

A specially designed lock for Ford cars is illustrated herewith. It is designed to be fastened to the Ford magneto brush connection and when in place projects through the floor beneath the coil. Pushing the foot lever on the lock automatically shuts off the engine and locks the car. To start the engine the lock is released by a key and the lever turned upward, thus making the electrical connection, which is necessary before the engine can be started. The device is enclosed in a case hardened steel tube and when locked it is impossible to make a new connection with the magneto or remove the lock without destroying the magneto connection, thereby putting the car out of commission for the time being.

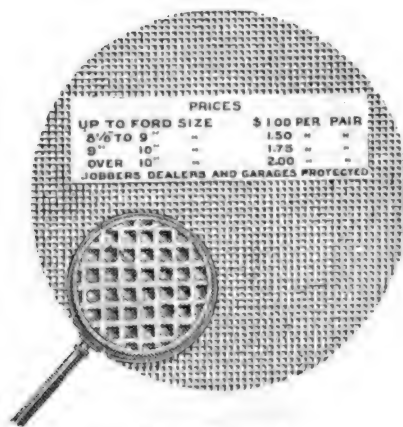
Distributed by Wallace C. Hood Service Bureau, 636-7-8-9 Dime Bank Bldg., Detroit, Mich. Price, \$5.

KAHN AUTOMATIC VALVE.

One of the special features of the Armstrong tubes is the standard equipment of Kahn automatic valve attached to every tube. A sectional view of it is illustrated herewith. The outside size and shape are similar to other tube valves. It is the internal construction that differs. Beneath the knurled collar indicated by the arrow at the top of the illustration is a graduated dial marked with five figures, 50, 60, 70, 80 and 90 pounds. The knurled collar is turned until a certain projection on its face fits into the slot above the figure indicating the pressure desired in the tube. An air supply is connected with the valve by the usual method. When the pressure in the tire



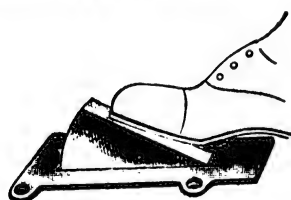
Upper Illustration, A. & H. Valve Tool; Lower, Cross Section Cut of Same.



Saferlite Lens.



J. H. Tonneau Shield.



Above, Foot Accelerator; at Left, Kahn Automatic Valve.



Detroit Cartridge Lock.

reaches the desired figure the valve automatically closes and the air from the pump passes through a port to the outside with a whistling noise, thus giving warning that the tire has the desired pressure. The manufacturers claim that it is impossible to put more air into a tire after the pressure at which the valve is set for is reached.

Manufactured by the Armstrong Rubber Co., Inc., 118 Adams St., Newark, N. J. Prices for tubes upon request.

A. & H. VALVE TOOL.

This device is an implement for truing up both internal and external valve and cap threads of nipples of pneumatic tires. It may also be used for cutting threads, making it a valuable addition to the tool kit. The illustration shows a cross section of the tool as it appears when it is applied to a valve and clearly illustrates its method of application. The makers claim that it is a simple, easily operated instrument with which imperfect threads may be recut 100 per cent. true.

Manufactured by A. & H. Manufacturing Co., Inc., 505-7 W. 45th St., New York, N. Y. Price, \$1.50.

FOOT ACCELERATOR.

Hoyts' Quality Foot Accelerator can be put on a car by anyone in a half hour or less and when attached needs no attention or adjustment. The action of the accelerator in no way disturbs the throttle adjustment.

Manufactured by Hoyts Auto Supply Co., 370 Fairfield Ave., Bridgeport, Conn. Price, \$1.25 complete.

SAFERLITE LENS.

The Saferlite lens is a glass which is designed to be attached to headlights and by its use it is claimed that all headlight glare is eliminated. As our illustration shows, this glass is made up of a number of squares, or reflecting planes, by which the light is refracted and "mellowed." It is claimed that it is impossible to get a blinding light from this lens, that the light is shadowless and that though light projection is complete there is no direct beam.

Manufactured by Saferlite Lens Co., 220 Fifth Ave., New York. Prices as shown in cut.

J. H. TONNEAU SHIELD.

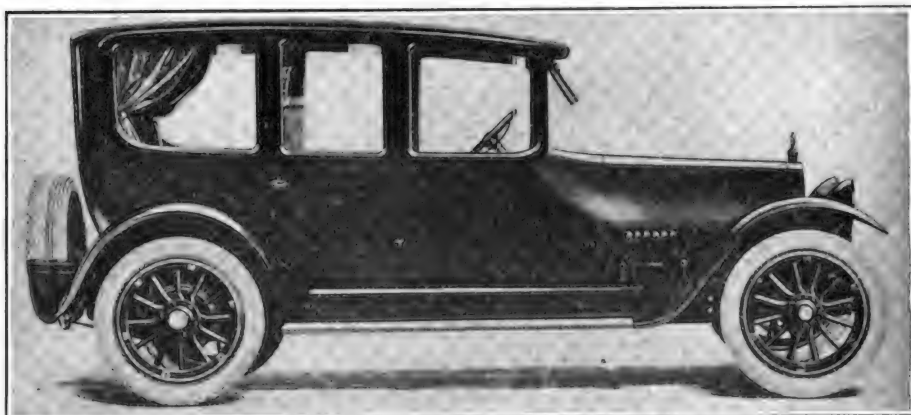
Designed to insure the comfort of passengers on the rear seat of an automobile, the J. H. tonneau shield can be placed in practically any position, fully protecting the tonneau from dust and dirt. When not in use it may be folded back of the front seat. It does not interfere with ingress to or egress from the car at any time, a feature that is made possible by the sectional folding design.

Manufactured by J. H. Tonneau Shield Co., 1777 Broadway, New York, N. Y. Prices ranging from \$20 to \$60 according to size.

Kissel Company Produces 12 Cylinder Car

A MODERN product to the last minute is the new 12-cylinder car just made available by the Kissel Motor Car Co. to those who insist on having a classic car. The KisselKar is more than well known; it sets a high standard in engineering and presents many economies and points of comfort. The high quality of Kissel products is well maintained in the splendid offering now made, both in an all-the-year round car and in the seven-passenger touring type. A review of the points of excellence in mechanical construction and general merit is herewith subjoined.

Double Six is the official title of this car announced by the Kissel Motor Car Co. of Hartford, Wis. Before putting this car upon the market the makers made exhaustive experiments,



Kissel Double Six All-Year Sedan, Classic and Refined, Which is Priced at \$2650.

treated alloy steel tubing $\frac{5}{8}$ inch in diameter.

Only one camshaft is used. It is a special alloy steel drop forging, case hardened and revolves in phosphor bronze bushings. All valves are completely housed inside cylinder blocks and are operated from the single camshaft. Heads and stems are welded together.

Oil under pressure is conveyed to all crankshaft and lower connecting rod bearings and to idler gear bearings by a positive gear type pump, other parts being lubricated by splash.

Positive circulation through a square tube, honeycomb radiator is assured by a centrifugal pump. Radiation is assisted by a light weight pressed steel fan with heavy hub, mounted on ball bearings supported by an adjustable bracket, and driven by a flat belt from the generator and water pump shaft.

Carburetor Mounted High.

A standard float carburetor is mounted high in the V and the intake manifold is jacketed for water supply from the radiating system.

Ignition current is distributed with a separate distributor for each set of six cylinders by a Delco two-unit system, and spark advance is controlled by a hand lever on the steering post.

The transmission gearset case is attached directly to the engine and a bell housing at the front contains a dry, multiple disc clutch with asbestos faced mats, driving against hardened and ground steel plates. The gearset is of the selective, sliding gear type with three speeds forward and reverse. All gears and shafts are of heat treated alloy steel and are mounted on Hyatt bearings.

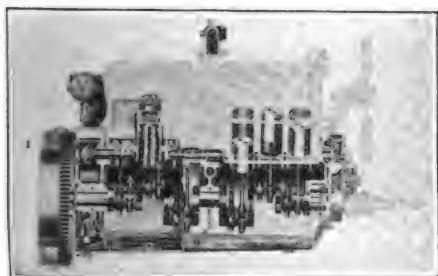
Power is carried to the rear axle through a Spicer universal joint and a pinion shaft, which is mounted on two Timken bearings.

Construction of Axles.

The rear axle is of the full floating type, the drive and torque being through the springs. The differential is made of high grade, heat treated malleable steel of large size, mounted on Timken roller bearings, all parts being hardened and ground. Shafts are made of chrome vanadium steel. Pinion and drive gears are of the spiral type.

A front axle of I beam construction is mounted on two-inch wide chrome vanadium steel, semi-elliptic springs. The rear axle is mounted on $2\frac{1}{4}$ -inch wide $\frac{3}{4}$ elliptic springs of the same material.

The frame is of channel beams rigidly



Phantom View of Engine.

subjecting it to trying road tests in various parts of the country, over hills and rough roads; the results, they say, surpassed their highest expectations of flexibility, speed and general merit.

The 12-cylinder, L head engine has a bore of $2\frac{7}{8}$ inches and a stroke of five inches, developing 39.7 horsepower, S. A. E. rating, or 82 brake horsepower. Cylinders mounted V shape at an angle of 60 degrees are cast in four units of three each, with water outlet and gas intake headers integral. Cylinder heads are cast in two blocks of six each and are of the valve-in-head construction.

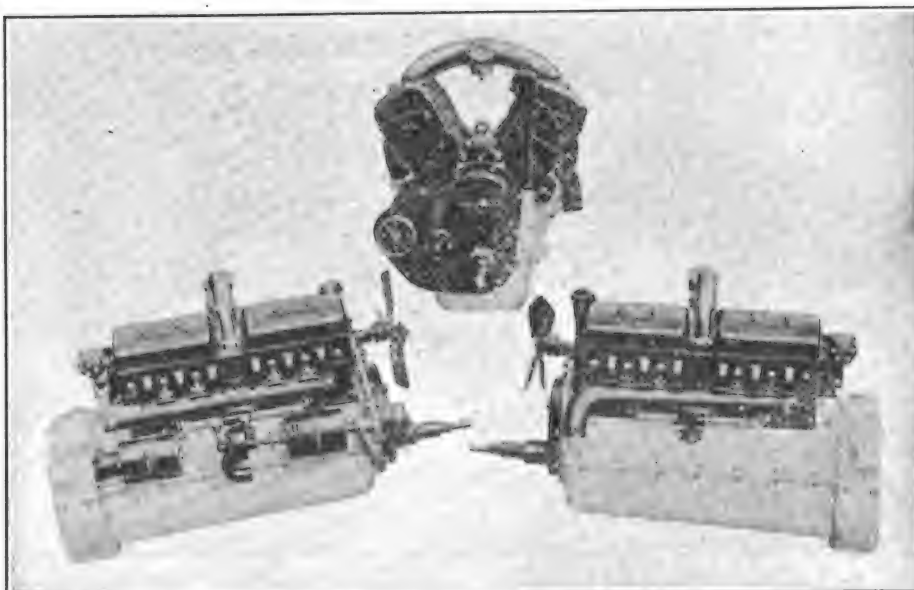
Light pistons of semi-steel are provided with three rings each.

The crank case is made in two sections. In the upper half are carried the cam and crankshafts; the lower half is removable, affording access without disturbing other parts.

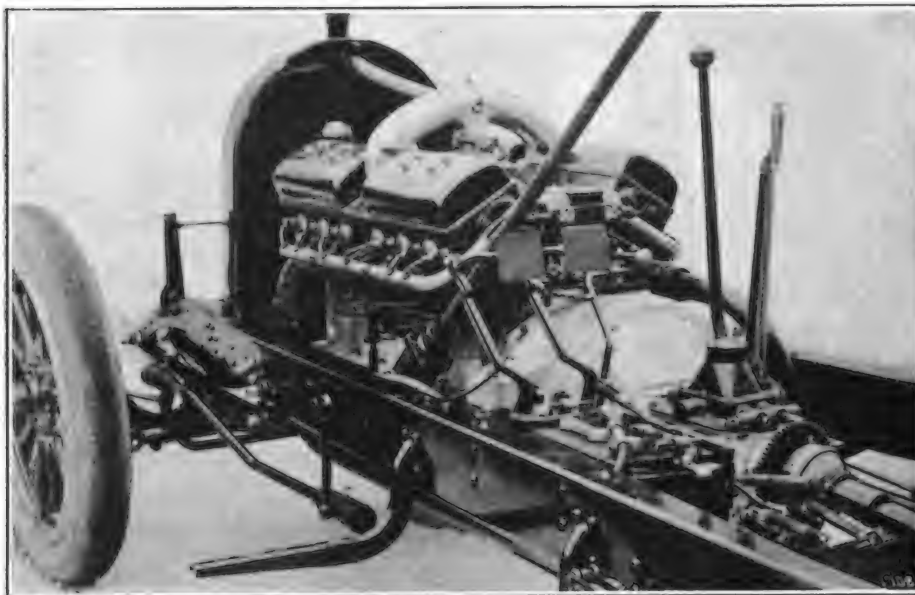
Placing of Crankshaft.

Made of double heat treated, selected forging bar steel and counterbalanced, the crankshaft revolves in three die cast bearings on two-inch journals.

Drop forged, heat treated steel connecting rods are mounted on the crankshaft, with phosphor bronze bearings carefully machined to two inches bore. The wristpins are made of specially heat



End and Side Views of the Power Plant of Kissel Company's Latest Production.



Double Six Engine Mounted on Chassis, Showing Prominently Design and Placement of Water Jacketed Intake Manifold.

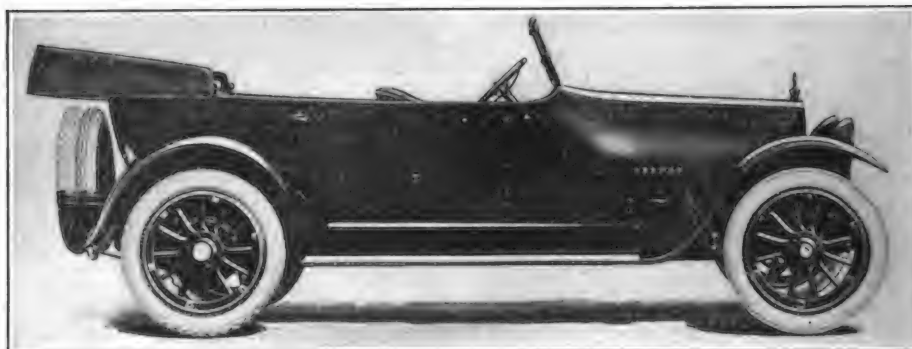
braced and of arch construction, which admits a low hanging body without sacrificing road clearance.

Twelve-spoke wheels of second growth selected hickory with nut flanges are standard equipment, while wire wheels may be furnished at \$100 additional. The rims are Firestone demountable, and are fitted with Goodyear cord tires 34 by 4½ inches.

Steering knuckles and arms are made of chrome vanadium steel and are heat treated. The steering wheel, 18 inches in diameter, is mounted on adjustable ball thrust bearings on the left side of the car and acts through a semi-irreversible split nut and screw type arrangement.

Service brake and clutch pedals are also at the left side of the car. Speed control lever and emergency brake are mounted at the centre. Both the emergency and service brakes are original

and exclusive Kissel features, being external contracting, acting on 1¼-inch by



Double Six Seven-Passenger Touring Car of the Kissel Company, Priced at \$2250.

two-inch drums and fitted with hand nut adjustment.

Current for lighting, starting and igni-

tion is generated by a Delco dynamo and stored in a six-volt, 108 ampere-hour Willard storage battery, which floats on the line. The starting motor is also of Delco design and the engine is started by its engagement with the flywheel through a Bendix drive.

Ignition, fuel mixture, lighting control, speedometer and all instruments are mounted on a straight line dashboard, which may be illuminated at night.

Choice of Bodies.

Either of two bodies are furnished for this chassis, a seven-passenger touring at \$2250 and an all-year sedan with removable top for \$2650. In general appearance both bodies are "distinctive" and graceful, the hood lines blend perfectly with the body lines, as shown in illustration. The sedan top, which is removable, conforms with the "stylish" finish of the body.

All bodies which are interchangeable are built in the Kissel shops of high grade selected ash, rigidly braced and covered with silver finish pressed steel. It is interesting to note that 22 body finishing operations are used in the making



Rear End of Kissel Double Six Chassis, Replete with Rugged Lines and Strong in Component Members.

of the Double Six.

Standard bodies are upholstered in long grain, hand-buffed, black leather, over the best cushion springs and genuine curled hair, though, if one desires, mohair may be used at an additional cost of \$25, or tapestry mohair at \$100.

A corridor between the front seats affords easy access to the tonneau. Ample facilities for storage under the seats and in pockets on the doors are provided in each car.

Top and Equipment.

A one-man, water proof, summer top, clamped to the windshield, of special design, is the standard equipment, and detachable winter tops under the trade name of the "All-Year Car" are obtainable at additional cost. With the summer top are instantly adjustable side curtains, which are said to be storm tight.

The equipment consists of a Sparton motor-operated warning signal, lock on ignition, electric indicator, tire repair outfit, jack, kit of tools, foot rail, robe rail, two extra demountable rims, top and a speedometer which is operated from the propeller shaft.

**REMOVING CYLINDER HEADS.**

(Figure 334 A.)

Cylinder heads frequently become firmly fastened to the engine block so that it is not an easy matter to take them from the engine without damaging the gaskets, even after all of the retaining bolts have been removed. To remove such cylinder tops, take out all of the spark plugs, turn the crank until the two end pistons are at the bottom of their stroke and into each insert a block of wood about three-eighths of an inch in diameter, around which has been cut a shoulder two inches from the end, as shown in the illustration. When the crank is turned and the pistons rise the shoulder presses upon the inside of the head and it is an easy matter to force it from the block.

UTILITY MIRROR.

(Figure 336.)

In one side of a piece of oak board, four inches long, $2\frac{1}{2}$ wide and $\frac{1}{2}$ inch thick, gauge out a square recess $3\frac{1}{2}$ by two inches, as shown at A. Into the centre of the back screw a binding post, as shown at B. A plain mirror, such as is found in a vanity case, is next fitted into the recess and held by means of four short strips of brass across the corners, as shown at C. A length of wire is bent into a Z shape and one end inserted in the binding post on the back of the mirror frame. We suggest a few of the uses of this little mirror: It may be used in the crank case for examining the wrist pins, in back of the radiator for examining fan and timer connections, in the transmission for inspecting the backs of gears, etc. It may be fastened to the windshield by a binding post soldered to a piece of hard brass, as shown at D.

DRUM HOIST.

The next time you are stuck in the mud or sand remember that you can fasten a rope to a tree or post, give it a turn around one of the rear wheel hubs and start the engine on either low or reverse, and by holding the rope taut the automobile will pull itself toward the post or tree. The action of the rope upon the hub is the same as that of a drum hoist. Of course it will be necessary to hold the other rear wheel stationary either by a rope or chain, unless it is on solid ground.

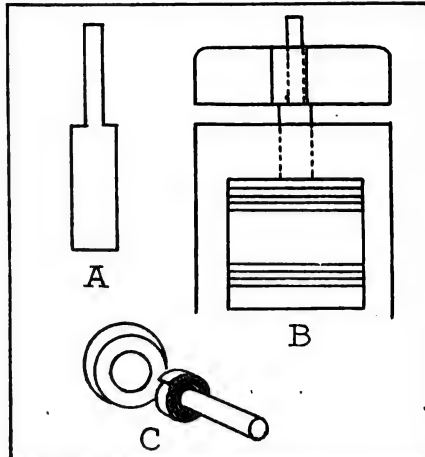


Fig. 334—A, Block for Removing Cylinder Head; B, Same in Use; C, Temporary Bushing.

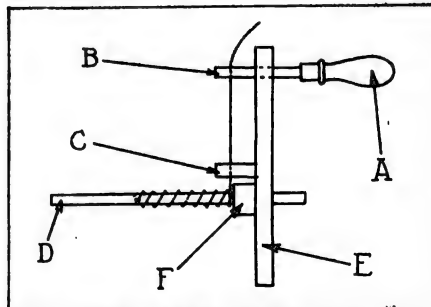


Fig. 335—Spring Winder.

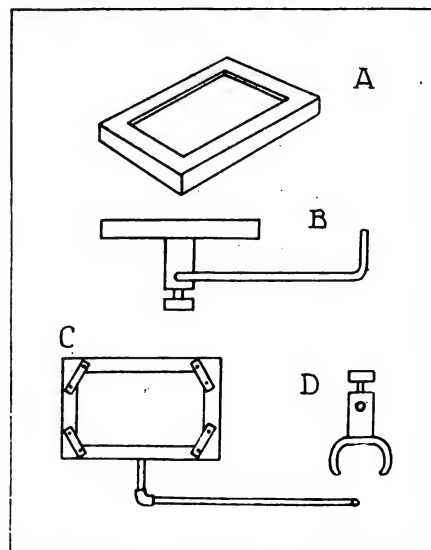


Fig. 336—Utility Mirror.

SPRING WINDER.

(Figure 335.)

While a lathe is perhaps the most efficient spring winder, it has its disadvantages. An end is very apt to work free, whip around the arbor and inflict a very severe cut in the hand of the operator. Such an accident cannot happen with the device illustrated in the cut.

A strip of wood, "E," has a handle at one end, "A," a hole at the other end large enough to fit over the largest size arbor and two wire guiders, C and B.

The arbor is put into the vise and one end of the spring wire fastened. As the handle "A" is swung around the spring begins to form on the arbor, the growing coils of the spring pressing against F keeping the spring closely coiled. The supply of wire passes through B and C, and should it break off the broad arm E prevents the loose end from cutting the operator.

TEMPORARY BUSHINGS.

(Figure 334 C.)

It is sometimes desirable to replace a badly worn bushing, but lack of time prevents. Then, too, such a replacement may not be entirely necessary and may be left until the car is overhauled. The illustration shows such a replacement, which is rather crude, but practical. It is applied by winding a piece of thin brass around the journal until the outside diameter is equal to the internal diameter of the bearing. It is then slipped along the journal and forced into the bearing, being held in place by a small set screw if necessary.

CUTTING THREADS.

The following method may be used in cutting threads and making nuts of odd sizes for very small work. If it is desired to thread a piece of copper wire, and make a small brass nut for the end of it, and the proper size die or tap is not at hand, try the following method: A hole slightly smaller than the copper wire should be drilled in a sheet of hard brass and a round file used as a tap for cutting the thread in the hard brass sheet. A portion of the copper wire can be threaded from this piece of brass used as a die. The file is used for making the nut to fit the wire. It is necessary to make a number of dies, as they very quickly wear out.

MECHANICAL TIRE PUMP.

(Figure 342.)

How many there are who have started on an automobile trip with anticipation of rest and been deprived of all pleasure by being obliged to pump up three or four tires. If one cares to eliminate this work one will take advantage of this suggestion and make a pump arrangement which may be driven from a rear wheel. Attach a heavy iron hook underneath each running board on the automobile, near to the outside edge. Bore a hole in the foot step of the tire pump large enough to take the hook. It will probably be found necessary to bend the plunger into an eye so that a bolt may be slipped through it. Provide a length of strap iron long enough to reach from this eye to the hub wrench, which is placed over the hub of the rear wheel, as shown in the illustration. The whole assembly is shown. If one is provided with a long enough air tube it will be possible to inflate either of the three tires. The other tire may be inflated by placing the pump on the other side of the machine. There are three ranges of speed at least, as it does not matter which way the rear wheel turns.

Jack up one rear wheel, attach the pump as shown, start the engine, throw in the clutch and let the engine do the heavy work of pumping up the tires.

RATTLE SILENCERS.

(Figure 339.)

Many of the squeaks and rattles about an automobile are caused by loose rods, frequently in the steering system. There is illustrated herewith a device for overcoming such rattles where two or three such rods are near together. The method shown at A is adaptable where three rods are parallel. At B is shown an arrangement for silencing a two-rod combination. At C is shown a similar device as applied to a yoke. In each case the silencer consists of a strip of spring brass or steel bent into the shape as shown in the cut.

CIRCULATION HINT.

(Figure 340.)

At present, many small cars are being remodeled and used for racing. Some of them, being equipped with comparatively low speed engines, are not fitted for high speed work and auxiliary fittings are necessary. A simple thermo-syphon cooling system may be found inadequate and may require mechanical circulatory air. We give a suggestion for such an equipment in the illustration. With an arrangement such as is shown, very little machine work or alteration of original

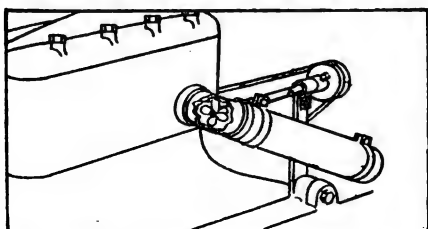


Fig. 340—Thermo-Syphon Auxiliary Pump.

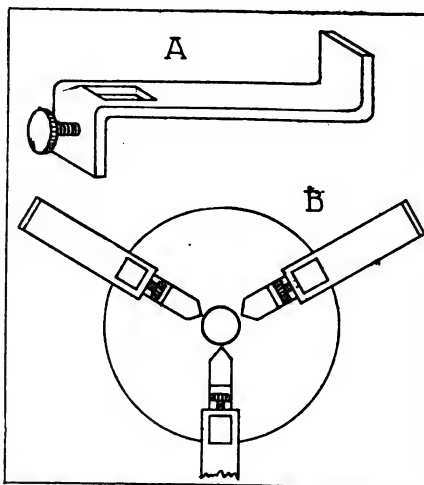


Fig. 337—Enlarging a Chuck.

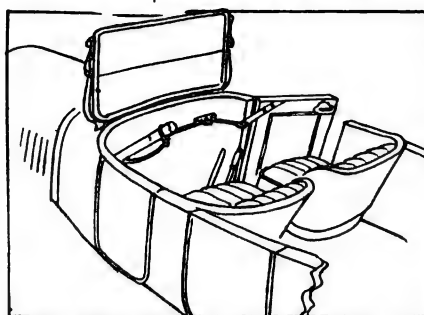


Fig. 338—Illustrating Method of Closing Automobile Door.

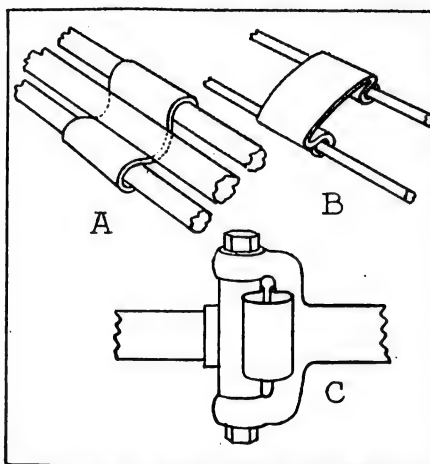


Fig. 339—Suggestion for Making Rattle Silencers.

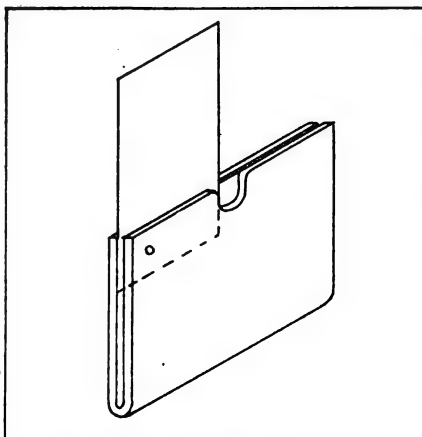


Fig. 341—Clearance Tester.

design is necessary. At the same time, however, the water is kept circulating by the fan arrangement in the water connection. A hole is drilled in the water coupling as close to the bend as possible. In this hole a shaft is fitted, projecting into the coupling. A two, three or four-blade fan, made of sheet iron, and bent similar to a boat propeller, is fitted to the end of the shaft. A suitable iron bearing is provided for the other end. The fan and shaft may be driven by score pulleys and belt either from the crankshaft or fan pulley.

CLOSING AUTO DOORS.

(Figure 338.)

A "jitney" owner who has been put to considerable trouble by the swinging open of the fore door of his automobile, adopted the following arrangement for closing the door without the necessity of reaching over to the side of the car: A piece of flat iron was attached to the back of the door as shown in illustration. To it was fastened a length of clothes line. The line was run through roller blocks to the steering column, where it was fastened. To close the door it was only necessary to give the line a quick tug. The line also served the purpose of preventing the door from swinging open too far on its hinges.

ENLARGING A CHUCK.

(Figure 337.)

The repair man frequently finds that his lathe chuck is not large enough to allow a piece of work to be inserted between the jaws. Bend a strip of strap iron in the form shown at A in our illustration. A square hole is pierced through it and one of the elbows is provided with a set screw for fastening the device to the chuck jaw. Our second illustration shows a three-jaw chuck with three of these auxiliary jaws in place. The size of the work is only limited by the size of the lathe.

CLEARANCE TESTER.

(Figure 341.)

Valves should be inspected at least once a week, and the clearance between the valve stem and tappet adjusted. The thin sheet of metal used for measuring this clearance is easily mislaid, or bent and destroyed. Our cut shows a safety razor blade riveted between the folds of a piece of tin. The blade is opened in a manner similar to opening a jack knife, the thin edge being protected by the tin. Before boring the razor blade for the rivet it will be necessary to heat the corner portion red hot, letting it cool slowly to remove the temper.

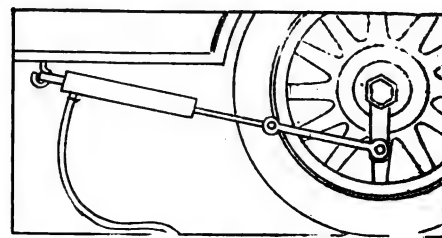


Fig. 342—Mechanical Tire Pump.

Princess Car a Neat Four Thirty-Six

IN THE Princess car the makers have sought in their product the attainment of strength without prohibitive weight, and how far they have succeeded in their purpose their attractive model for 1917 is full and complete evidence. In line and finish the car is impressive. The makers pay particular heed to the growing trend of the users' demand for more roominess of body, and announce upholstery and other appointments on a corresponding scale of satisfaction. This car is made by the Princess Motor Car Corporation, Detroit, Mich., and has an appeal in its class to those discriminating in their selective mood on the more salient points of motor car construction.

On the constructive side of the



Princess Four-Thirty-Six Car, with 108-Inch Wheelbase.

three bearings. All connecting rods are made of 30 to 36-point carbon steel, drop forged and heat treated. The camshaft is driven by silent chain. Valves are made adjustable with cast iron heads and steel stems, and are entirely enclosed. A force feed plunger, operated from No. four exhaust cam on the camshaft, forces oil to a sight feed mounted on the dash board and thence to engine.

Cooling is accomplished by the thermo-syphon system through a tubular radiator. Radiation is promoted by means of a steel fan mounted on an adjustable bracket and driven by a flat belt from the crankshaft.

Since the carburetor is mounted high on the side of the engine, a short intake manifold is made possible. On the same side of the engine with the carburetor there is mounted a high-tension magneto, driven by silent chain, the output of which is used for ignition.

The engine is supported at three points and forms a unit power plant with the clutch and transmission gearset.

Power is carried from the engine through a single steel drive plate, which is placed between two wire woven asbestos faced friction discs. This combination, running in oil, forms the clutch arrangement and transmits the power to a Grant Lees, three-speed forward and reverse transmission gearset.

Two universal joints are provided for the drive shaft, through which power is transmitted to a full floating rear axle. The front axle is a drop forged, I beam section, double heat treated.

Front springs are semi-elliptic, rear $\frac{3}{4}$ elliptic. The main leaves of both sets are made of vanadium steel and guaranteed for two years, while the frames are of special pressed steel, channel section.

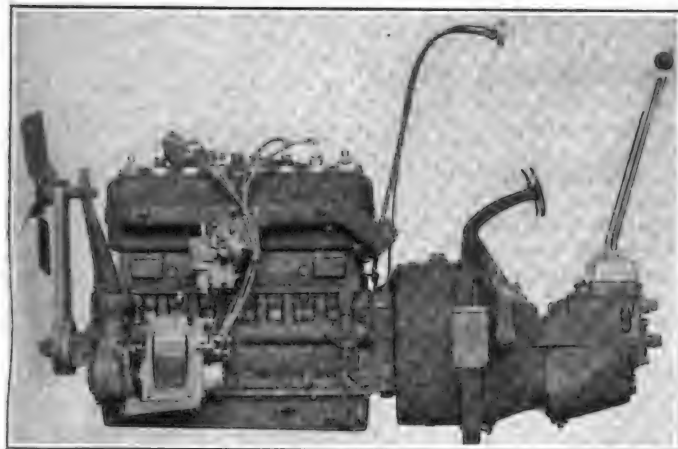
Artillery wheels are made of seven-year hickory with demountable rims and fitted with 32 by 3 $\frac{1}{4}$ -inch tires. These are smooth tread front, non-skid rear and are standard equipment. On the points of contact measurement a wheelbase of 108 inches permits short turning radius.

Steering is accomplished from the left hand side of the machine and through an adjustable worm and worm gear type arrangement. Clutch and service brake are placed on the left side of the car, with gear shift and emergency brake levers at the centre. Both brakes act upon 12-inch wheel brake drums. The emergency is internal expanding and the service external contracting.

The electrical starting and lighting system is of the two-unit type. The lighting dynamo is driven by a silent chain running in oil and the starting motor has a Bendix drive to the flywheel.

A choice of either of three bodies is offered at a price of \$775, a five-passenger touring car, a three-passenger roadster and a speedster.

The standard equipment consists of speedometer, neverleak, one-man top, storm curtains, two-piece rain vision windshield, two electric headlights with dimmer attachment, dash and tail lights, number bracket, robe rail, tire holder, one extra rim, tool kit, pump and electric bugle signal.



High-Speed, L Head, 4 $\frac{1}{4}$ Stroke Princess Engine.

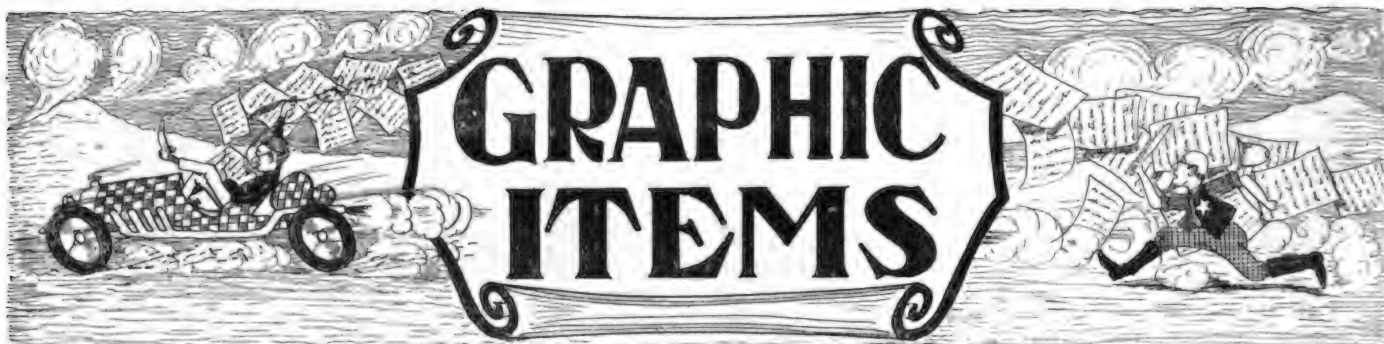
Princess, compactness of the power plant is one of its leading features. The engine responds under load variation with power and elasticity. Mechanically considered the engine is of the L head type, four cylinders cast en bloc, with a bore of 3 $\frac{3}{4}$ and a stroke of 4 $\frac{1}{4}$ inches. This furnishes 22 $\frac{1}{2}$ horsepower S. A. E. rating, or 36 horsepower at a normal speed of 2800 revolutions per minute. Detachable cylinder heads afford access to the interior of the cylinders and valves. Pistons are made of a high grade of gray iron.

Made in two sections, the crank case is attached by 10 bolts to the cylinder block. In the upper part, which is cast integral with the flywheel housing, the crank and camshafts are carried. The lower part, which acts as an oil reservoir, is removable, thus affording access to the interior.

The crankshaft, which is made of 35 to 40 point carbon steel, drop forged, heat treated and with all bearings accurately ground to size, is supported by



Radiator Front of Princess.



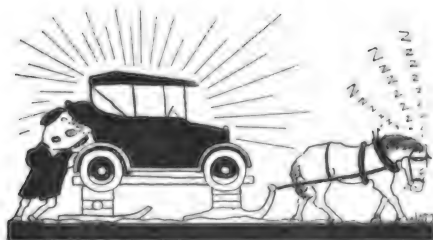
What has long seemed impossible of solution, the prairie dog menace, now appears to have been solved through the medium of the automobile. "Dose them with carbon monoxide—that will fix 'em," says a resident of Santa Fe, N. M. "Where do you get it—at the drug store?" he was asked. "Out of the exhaust of your flivver," was the answer, and then he went along to explain how he had exterminated hundreds of the little pests by simply attaching a hose to his exhaust and sticking the other end down in the dog hole. After the outlet to the hole are plugged up the engine is started and the prairie dog succumbs in his last and long sleep. It is a humanitarian method also, as the death inflicted is painless.

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The Newark, N. J., Automobile Club recently staged a 24-hour endurance run. Tire punctures, it is understood, registered a low percentage, which may be accredited to the wisdom of the committee in scheduling their event far in advance of the mosquito season.

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It was a hard Winter, with snow six feet deep in Northern New England. Most of the forehanded few who secured their automobiles early succeeded in driving them through all snow impediments to the home garage, so as to get an early

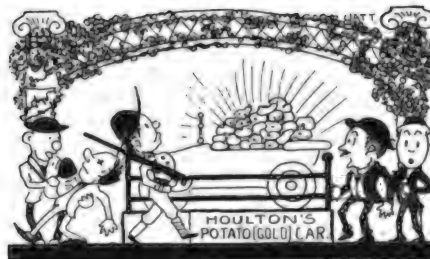


start with the season. One is reported as having been compelled to call on Old Dobbin to get his auto home.

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Sunday baseball games were allowable and popular in Evansville, Ind., before 1900, so the approaching season for the popular pastime will have nothing new in that particular. Before the century began, one historic game on Sunday afternoon broke up in the third inning because of the arrival on the grounds of an automobile. This year they are compelled to provide generous parking space for dozens of them along the right and left field foul lines.

Houlton, Me., a progressive town in the heart of Maine's potato country, held its first automobile show recently. While the rest of the country was groaning about the high price of potatoes the citizens of Aroostook county were happily looking over 1917 models and investing in them. They have been waiting a good



many years for prosperity. The show, needless to say, was a grand success.

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A Maine senator is running a little anti-noise crusade of his own. His bill, introduced in the Legislature, would prevent unusual and unnecessary loud signaling by automobile drivers, cutting out the muffler or allowing a needless amount of smoke to escape from the exhaust. Legislators, from listening to their own exhaust, learn to appreciate the value of silencers.

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Tires should never be used when under-inflated.

In handling gasoline don't keep a lighted cigar around.

Make sure that the engine receives plenty of oil, it is necessary.

Every bit of oil that is put into the engine should be strained.

Liquid in the storage battery should be kept at the proper level.

Your reverse gear should not be used as a brake.

Don't race the engine when the car is standing idle.

On slippery streets, drive slowly—an ounce of prevention is worth a pound of cure.

Never apply brakes suddenly, except in cases of emergency.

Tighten up all bolts and nuts at least every 1000 miles; don't neglect them.

Springs should be kept well lubricated; don't let them get dry.

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Senator Weeks of Massachusetts has put himself on record with many other public spirited men who favor uniformity in automobile laws among all the

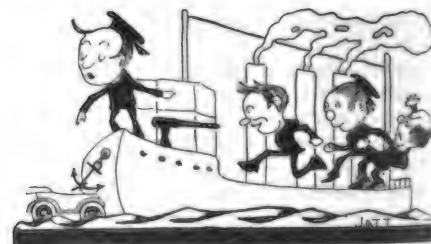
states, instead of the present highly discriminatory statutes that are really a disgrace to the states in which they are in force. The movement to have Congress recognize the automobile as a vehicle of interstate commerce and to pass laws regulating its interstate traffic is gradually gaining ground, and, if anything, the unfair laws in some states are having the effect of stimulating interest in the movement that will mean the death knell of short sighted politicians who are attempting to raise revenues from strangers within their territory.

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The old saying, "You've got the car before the horse," as literally applied, will no longer hold good if the ideas of a citizen of Wichita, Kan., prove practical. While he does not really intend to actually place the cart before old Dobbin, his plans call for a similar procedure, as he is going to place the plow, mower and reaper before the tractor instead of pulling or towing those implements. As startling and revolutionary as the idea seems, the inventor claims that it will dispense with a lot of wheels and gears of the implement, and the plows and other farm implements attached will be in front of and visible to the operator.

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While on guard duty "somewhere along the Atlantic coast," the U. S. S. destroy-



er Benham raised from the ocean bed a five-passenger automobile when hauling up anchor. This is declared to be no fish story. Prize money was divided among the crew when their catch was sold in port.

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Tire making machinery was set up in the Federal building at Cincinnati, O., so that the judges of the U. S. Circuit Court of Appeals could see how this now universally used article is manufactured. The case before the court was that of the Firestone Tire and Rubber Co. against Frank Seiberling of the Good-year Tire and Rubber Co.

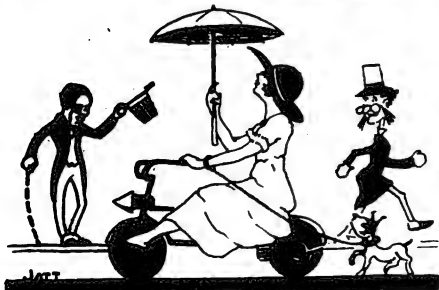
Metz Hall, the big popular exhibit at the Boston Show, might well be termed a beauty annex, according to old-fashioned ideas of the term, as the illustration in The Automobile Journal review number, March 10, of that particular exhibit will attest. A special training



course maintained by this company equips their feminine employees on the proper handling of a prospective customer.

The Bureau of Mines in a report made to the Federal government for the purpose of guiding government officials in the purchase of gasoline, has divided it into three classes, as follows, straight refinery, blended casing head and cracked and blended gasoline. The high grade gasoline is to be used for special purposes, such as for aeroplanes and should include products, the report says, of the type now sold in the eastern market as of 70 degrees Baume or over. The middle grade is to be used for motor cars of a design of two years ago and is represented by a type of gasoline now sold in the eastern market, which ranges from 65 to 70 degrees Baume, and the third grade is represented by the gasoline now sold in the eastern market as around 60 per cent. Baume gravity, and can be used satisfactorily in up-to-date motor car engines that have been improved so that they can use a heavier grade of fuel than those made several years ago.

The Monauto car, which resembles a miniature motorcycle, is the latest fad of the actresses who find financial remuneration in connecting themselves with any of the latest creations that will attract public attention. In one of the large cities recently one of the leading ladies surprised the dignified citizens by riding down the main streets on one of these machines with her daintily clad feet astride of the forks, holding a sunshade aloft and with a poodle bringing up the rear on a leash, puffing with al-



most as much energy as the little motor that was propelling her ladyship.

In the event of war the United States government will have at its disposal over twice as many motor trucks and pleasure

cars as are at present in the service of all the fighting nations in Europe combined.

Another April war is the expectation. To the average motorist who has been enrolled for several weeks in the lists of his town or district for a call in case of mobilization, the busy days are already here. Down around the Grand Army Hall one can hear the grandsires who have been fighting the battles of the Civil War over for these 50 odd years, estimating what they could have done along the Appomattox and elsewhere if they had only had these high powered pulling machines in those rainy, sloshy, muddy days.

Magistrate House of the Traffic Court, New York City, in sentencing a youth to



the work house for five days on the charge of exceeding the speed limit on Riverside Drive in that city, attacked the law which permits an unlicensed driver to operate a car just because he owns one. "Under the present statute," the magistrate said, "a man can make his car a murder machine even if he has one glass eye, a wooden leg and an artificial arm. This is not so much the fault of this boy as the stupid law of the state." Thereupon the taxi drivers started a petition to have the magistrate unbenched.

Palm Beach had a wonderful season a wheel. On the promenade it is a question always whether it is the motor or its manipulator which commands so many admiring glances. The maid a wheel, however, surely fetches attention every time.

Berkeley, Cal., is out to abolish the well known corner policeman. It is pay-

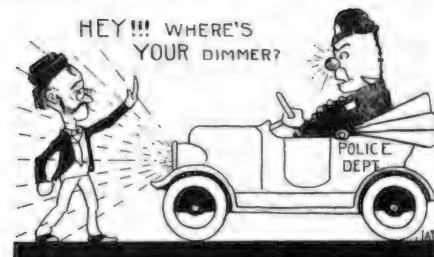


ing the upkeep for its policemen who will use their cars in covering their beats. They cover a great deal more ground and in minor cases persons who are arrested are taken to jail in the policeman's own car.

The inventive geniuses in the northern New England states who put runners on their flivvers during the past winter are now trying to devise a new type of traction agent that will serve instead of wheels during the spring thaw, and until the roads dry up sufficiently to per-

mit of the use again of the wheels with which their machines were originally equipped.

The authorities in Leominster, Mass., are growing more particular about the enforcement of the dimmer law. One of



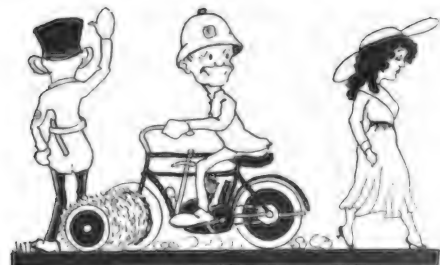
these days the situation may produce citizen traffic officers equipped with an imperious wave of the hand and a facility for saying "Stop!"

Charles E. Shiddell of Kansas City, during the recent automobile show there, drove his car from an incline that made it leap a distance of 70 feet, 11 inches, before striking the ground. This jump exceeds the previous record of 36 feet also made by an Elgin car.

One of the overtures in the political complexion of the world in March was the revolution in Russia. Automobile and other foreign trade interests are keenly interested as to what the outcome may be commercially. Every one considers that the Romanoff despotism is giving way to the United States of Russia, another republic and a big one.

As the opening of the season approaches all fears as to the much threatened over-production in the automobile industry are dispelled and apprehension is now felt in many localities as to the ability of the manufacturers to meet the enormous demand that has been indicated by the advanced orders and buying at the automobile shows. Despite the fact that practically every large manufacturer has increased the production schedule from 25 to 100 per cent, which fact at first lead to some forebodings over the possibility of the saturation point being reached, it seems almost certain that the coming season will find the producers thousands of cars behind the orders until late in the fall.

A motorcycle street sweeper that will work up a speed of 20 miles an hour is



the latest bid of Springfield, Mass., to maintain itself as a spotless town. The white wings who strode the machine reported his first trip the length of Main street as a perfect delight, and he never missed a charmer.



Convention of Chalmers Sales Organization Assembled at Detroit Factory—Back Row, Left to Right—E. A. Maybell, Texas; R. F. Keeler, Minneapolis; A. D. Kelley, Home Office; A. A. Crumley, Atlanta; W. H. Varley, New York; L. F. Johnston, Home Office; C. H. King, Manager of Dealers' Department; J. H. Falk, New York and Philadelphia; H. R. Beale, Home Office; J. B. MacMullen, Kansas City; R. L. Bland, Assistant to Manager of Department of Dealers; A. D. Frost, Special Representative; R. D. Pinkerton, Assistant to Mr. Frost; H. H. Cannon, Omaha; W. J. Drumpelmann, Assistant Sales Manager. Front Row, Left to Right—T. S. P. Griffin, Home Office; J. R. Whiting, Louisville; H. C. Arnold, Memphis; W. W. Rapp, Assistant to Mr. Kelley; E. W. Hansen, Home Office; J. P. Winterson, Cincinnati; C. H. Becker, Home Office; H. M. Allen, Oklahoma City; H. H. Halle, Home Office; C. L. Alexander, Home Office.

The Business Side of the Motor Vehicle Industry

The Amazon Rubber Co., Akron, O., is offering an issue of \$400,000 in common stock and \$100,000 of seven per cent. preferred stock. The proceeds will be used to greatly enlarge the present plant and enable the company to increase their production to meet the heavy demands for their products.

The Continental Motors Co. will retire its series of outstanding coupon notes of the total face amount of \$1,000,000 on April 1 at the office of the Liberty National Bank in New York City.

The Studebaker Corp. is now assembling a large number of cars at its plant in South Bend, Ind. Assembling equipment and facilities have been installed in a new factory recently acquired and the engines and other parts are shipped to the city from Detroit. About 10,000 cars a year will be assembled in South Bend to avoid the congestion resulting at Detroit annually from the freight car shortage.

The Standard Motor Parts Co., New Castle, Ind., escaped injury in the recent cyclone that swept the city on March 11, destroying 500 houses and killing close to 35 people. Business at the plant was re-

sumed the day following and the usual shipments were made.

The Franklin Automobile Co., Syracuse, N. Y., has now housed all its manufacturing units within the plant which includes five new additions and will speed up its production to a basis of 15,000 cars annually.

The Burgess Battery Co. has been organized at Madison, Wis., with a capital stock of \$200,000, and will engage in the manufacture of electro chemical products, dry batteries, flashlights and accessories. The company is an outgrowth of the C. F. Burgess Laboratories, Inc., of Madison.

The Swinchart Tire and Rubber Co., Akron, O., has issued \$500,000 seven per cent. cumulative and convertible preferred stock and is offering it to the company's stockholders at par on a basis of five-eighths of a share of new stock for one share of old. It is convertible into common stock at par at any time within five years.

J. W. Wellington, principal owner of the Mathews Engineering Co., Sandusky, O., and who also has other extensive interests connected with the motor car industry, has been appointed superintendent of production for the Emerson Motors Co., Kingston, N. Y.

J. T. Beadle, until recently with the Imperial Sales and Parts Company of Jackson, Mich., in which he still retains his interest, has been appointed purchasing agent for the Emerson Motors Co.

Marcus I. Brock has resigned as director of sales for the American Motors Corp., Plainfield, N. J. John C. Speirs, who was general manager of production at the plant, has also resigned.

M. R. Korshin, New England sales manager of the Atterbury Motor Car Co. of Buffalo, N. Y., has been appointed sales manager in the eastern district. His territory will include New England, Pennsylvania, Maryland, New Jersey and the eastern half of New York state.

The Post & Lester Co., Hartford, Conn., has been appointed distributors of S. K. F. ball bearings by the S. K. F. Ball Bearing Co., Bridgeport, Conn. The distributors will be able to supply S. K. F. radial and thrust bearings from stock at their branch houses in Boston, Bridgeport, New Haven, New London, Providence, Springfield, Waterbury and Worcester.

Russel T. Gray, formerly advertising manager of the Haynes Automobile Co., Kokomo, Ind., has joined the staff of the Shuman Advertising Co. of Chicago.

Leroy G. Feed has been appointed sales manager of the branch of the Willys-Overland Co. in New York City. He will manage the company's new store, which was recently opened at 50th street and Broadway.

Paul Gerald has been appointed general superintendent of the Puritan Machine Co., Detroit, Mich., and Charles H. Dawson has been promoted to the position of assistant service manager.

Arthur H. Brown has been appointed distributor of Studebaker cars at Albany, N. Y. He was recently in charge of the Pacific-Northwestern territory for the Studebaker Corp., with headquarters at Portland, Ore. He is a native of Boston and was in business in that city and at one time New England manager for the Warner Instrument Co.

The Springfield Body Corp., Detroit, Mich., has declared a regular quarterly dividend of two per cent. on its preferred stock, payable April 2, to stockholders of record on March 21.



M. R. Korshin, Eastern District Sales Manager, Atterbury Motor Car Co.



Ernest L. Smith, Newly Appointed Disbrow Distributor for the New England Territory.



First Annual Banquet Tendered to the P arts and Material Manufacturers at the Kaiserhof Hotel, Chicago, During the 1917 Show, by the Elgin Motor Car Corp.

The Hydraulic Pressed Steel Co., Cleveland, O., has declared a 125 per cent. stock dividend, through which the capitalization was increased to \$5,500,000. This announcement was made at the annual meeting, at which it was also made known that the purchase of the Cleveland Welding and Manufacturing Co. had been consummated. The new company will be conducted as a separate plant at present and the manufacture and sale of the Parker rim will be pushed.

E. I. Heinsohn and Henry Boehmke of the Cleveland Welding Co. have been elected to the directorate of the Hydraulic Pressed Steel Co., of which A. W. Ellenberger is the chairman. Mr. Ellenberger has been succeeded in the presidency of the company by James H. Foster, formerly vice president and general manager, who is succeeded in turn by H. P. McIntosh, Jr. Ben P. Pole was elected secretary, R. D. Mock, treasurer; H. B. Bole, general manager; O. P. Stehn, sales manager, and J. E. Maloney, sales manager of the pressed steel department.

A. P. Warner, president of the Warner Mfg. Co., makers of the Warner Auto Trailer, has purchased the interest in the company held by James Menhall, vice president, and as a result of the deal becomes the sole owner.

The Ford Motor Company, Detroit, Mich., has sent two of the new tractor plows to England. These machines will plow about six acres of land in eight working hours.

The United States Rubber Company at the annual meeting held in New Brunswick, N. J., elected the following board of directors: James S. Alexander, New York City; Walter S. Ballou, Providence, R. I.; James C. Brady, New York City; Nicholas F. Brady, New York City; Middleton S. Burrill, New York City; Samuel P. Colt, Providence, R. I.; Harry E. Converse, Boston, Mass.; Edgar B. Davis, Brockton, Mass.; James Deshler, New Brunswick, N. J.; James B. Ford, New York City; Francis L. Hine, New York City; Henry L. Hotchkiss, New Haven, Conn.; William S. Kies, New York City; Lester Leland, Boston, Mass.; Samuel M. Nicholson, Providence, R. I.; Raymond B. Price, New York City; Homer E. Sawyer, New York City; Charles B. Segar, New York City; William H. Truesdale, Greenwich, Conn.; Theodore N. Vail, Boston, Mass.; Ellsha S. Williams, New York City. James S. Alexander, William S. Kies and Charles B. Siegel are the new directors.

F. W. Roebbling of Trenton, N. J., treasurer and general manager of the John A. Roebbling Sons Co., died in that city on March 10. He was one of the directors of the Mercer Automobile Co. of Trenton. J. M. Kemp has joined the Scripps-

Booth Corp. as purchasing agent.

J. L. Dell has been appointed to succeed R. B. Herrick as purchasing agent of the Detroit Motor Car Co., Detroit, Mich.

The King Motor Car Co., Detroit, Mich., has patented the name "Foursome," which is the trade name of the company's four-passenger model.

The Hackett Motor Car Co., Grand Rapids, Mich., is developing an engine designed by F. M. Guy, chief engineer of the company. The new engine has the valves in the head. They are of the rotary type and do not depend upon springs or cams for action.

George D. Edwards, Jr. formerly of the Hayes Manufacturing Co. and recently with the Springfield Metal Body Co., has been appointed purchasing agent of the Parker Rust Proof Co. of America.

George E. Lane has resigned from the Neumann-Lane Co. to join the executive forces of the Parker Rust Proof Co. of America at its main plant in Detroit.

G. Vernon Beck has been appointed general sales manager of the Comet Automobile Co. of Decatur, Ill. Mr. Beck was formerly district manager of the Chalmers Motor Co. of Detroit and recently resigned his position as sales manager of the Elgin Motor Car Corp. to accept the general managership with the Comet Automobile Co.

The Elgin Motor Car Corp., Chicago, Ill., has prepared plans for the erection of an addition to the factory to provide for an annual output of from 20,000 to 25,000 cars.

Harrison W. Craver, chief librarian of the Carnegie Library of Pittsburg since 1908, has accepted a position as director of the library of the United Engineering Societies of New York and will take up his duties next month. The library that he is to take charge of is believed to be the largest engineering library in the world, with approximately 150,000 volumes of technological subjects on its shelves.

The Regal Motor Car Co., Detroit, Mich., will hereafter market its "4-thirty-two" model under the name of the "Hi-Power Four." When the company's engineers designed the car about a year ago, their object was to produce a motor capable of great power, extreme ruggedness and economical to operate. It has a $3\frac{1}{2} \times 4\frac{1}{4}$ engine, which is rated according to S. A. E. formula at 19.6 horsepower, which, in popular terms, is equal to 32 horsepower.

C. L. Nedoma has been appointed consulting engineer to the advertising department of the Chalmers Motor Co. and will co-operate with W. L. Agnew, director of advertising, toward improving advertising methods in the industry.

The Elgin Motor Car Corp. is following up through the industry the results of the movement inaugurated at the Chicago Show to facilitate the deliveries of parts makers. The purpose of the movement is spread broadcast and many efforts made to insure co-operation. Adverse freight schedules have bettered some since the movement began. Numerous well known manufacturers who were guests at the initiatory dinner continue to give their co-operation.

The Compradores, Inc., recently formed in Detroit, has taken quarters in the Dime Bank building and will market automobile accessories and materials. J. N. Lassen and R. T. Broadhead are the active members of the organization. They are representing the Primolite Co. of Indianapolis, the Detroit Gauge and Metal Stamping Co., Detroit, manufacturers of the Retlaw Gasoline Gauge for Ford cars; Fulton Grauter Carburetor Co. of Cincinnati, and the Detroit Motor Lock Co., manufacturers of the latest locking device



F. E. Mosher, Secretary and General Manager of the Covert Gear Co., Inc., Lockport, N. Y.



Goodyear Promotions: Left to Right—R. S. Wilson, New Manager Motor Truck Tire Department; G. E. Brunner, Manager of Service Department; C. W. Martin, Jr., Manager Southern District; W. R. Bliss, Manager New York District.

for Fords, the Detroit Cartridge Lock. The Wallace C. Hood Service Bureau has supervision of distribution for the Detroit Cartridge Lock for the entire United States and the Compradores will act as Michigan distributors.

The Owen Magnetic Car Co. of Boston has been organized with \$150,000 capital. Millard F. Chase, the present Boston distributor of Owen Magnetic cars, is president and treasurer of the company, and Shirley P. Graves, clerk.

The Pierce-Arrow Motor Car Co. of Buffalo, N. Y., has given a contract for the erection of a new factory building, 420x60 feet, four stories in height. The building will be of reinforced concrete throughout and will be erected under the direction of Frank B. Hubbard, engineer.

The Warnola Mfg. Co., Inc., of New York City, has been incorporated under the laws of New York state with an authorized capital of \$100,000. The company will manufacture the Warnola piston horn. The incorporators are: Speer Andrews, S. A. Campbell, George A. Arnold.

The American Motors Corp., Plainfield, N. J., held its annual meeting in Richmond last week, at which the following officers were elected: President, Wm. Howard Hoople; vice president, Louis Chevrolet; treasurer, George F. Baright; secretary, P. W. Hansl.

Joseph A. Carmody was appointed production manager in charge of the company's plant and manufacturing operations at Plainfield, N. J. Mr. Carmody was formerly chief engineer of the Wagner-Ward-Leonard Co., and construction en-

gineer of the General Electric Co., and supervised the construction and installation of electric locomotives for the New York Central railroad.

The P. J. Durham Co., 761 Park Place, Brooklyn, N. Y., has been appointed an official service station of the Westinghouse Electric and Manufacturing Co. for their electric starting and lighting systems as applied to automobiles. The Durham company also represents the Electric Auto-Lite Co. and the Gray & Davis systems in Brooklyn.

The Lee Rubber and Tire Corp., reports net sales for 1916 of \$3,587,761, and a net income of \$251,063, including \$4162 from rentals. After deducting \$13,726 for interest, discounts, etc., \$237,337 remained for dividends. Dividend requirements were \$225,000, leaving a final surplus of \$12,337. It was stated in the annual report that labor disturbances and high cost of materials reduced the profits during the latter part of the year.

The Disbrow Motors Corp. has been incorporated with \$300,000 capital to manufacture engines, motors and to carry on a business. The incorporators are: Louis Disbrow, 926 East 79th St., Cleveland, O.; J. J. Curl, 1826 West 81st St., Cleveland, O., and W. H. Byers, 125 Lake Ave., Saratoga Springs.

R. S. Wilson, the new manager of the motor truck tire department of the Goodyear Tire and Rubber Co., Akron, O., has been manager of the service department at Akron for the past four years. He has been succeeded by G. E. Brunner, who

was his assistant in the service department. Other changes in the Goodyear organization include the promotion of Walter R. Bliss to be manager of the New York district for the Goodyear Tire and Rubber Co., and the promotion of C. W. Martin, Jr., to the management of the southern district for the Goodyear company.

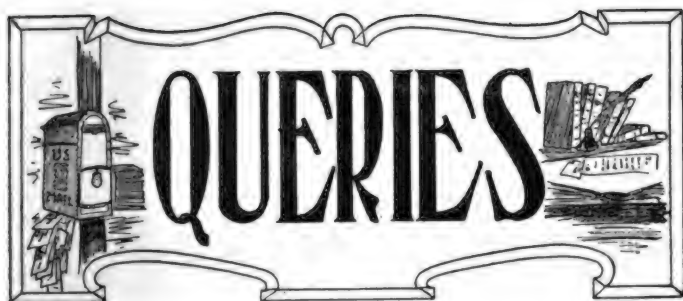
The Motor Car Equipment Co., New York City, in addition to the Rayfield Carburetor, has taken over the distribution of the Boyce Moto-Meter in the East and will handle it in 14 states, including New England, New York, New Jersey, Pennsylvania, Maryland, District of Columbia and Virginia.

The Firestone Tire and Rubber Co. held a big celebration in connection with the opening of its new branch in Pittsburgh, Penn., on March 1. The programme opened with a reception at the new branch, 5932 Baum boulevard, where General Sales Manager Partridge, Eastern District Manager Fairbank, Southern District Manager White, Pneumatic Sales Manager Sorrick, Advertising Manager Babcox and Rlm Sales Manager Carlton welcomed the guests. In the evening a banquet was held in the William Penn Hotel, which was attended by Robert Garland, president of the Chamber of Commerce, and City Solicitor O'Brien, who represented the city.

The Kelly-Springfield Tire Co. of New York City has declared a quarterly dividend of \$1.50 a share on its preferred stock, payable April 2 to stockholders of record March 17.



Group of District and Branch Managers of the Flisk Rubber Co., Chicopee Falls, Mass., Called from the Field Recently to Participate in the Annual Conference.



QUERIES

NOTICE TO READERS.

THIS department contains the Mechanical Editor's answers to readers' inquiries. It is open to every subscriber. If any part of your car is not operating satisfactorily, or if you desire information regarding operating, maintaining or repairing motor cars, do not hesitate to lay your troubles before him. He will answer promptly and fully, either by mail or in these columns, as you direct. This service is free to every subscriber, and is often the means of saving considerable money that otherwise would be spent with a garage man. Letters should always be signed with the writer's full name and address, and the car or part in question should be properly identified, by mentioning the maker's name, model, year of production or other distinguishing feature. Address all inquiries to the Mechanical Editor.

EMERGENCY BRAKE APPLICATION.

(H. H., Pittsburg, Penn.)

Will you please tell me what advantages are claimed by the car manufacturers in applying emergency brakes to a drum in the transmission instead of upon the rear wheels?

The main advantage claimed for a brake application of this sort is that more braking pressure may be exerted with the same amount of pressure than can be applied upon the wheels.

To explain this statement in another way. Consider a car in which the rear axle gear ratio is four to one, equipped with a brake drum in the transmission 12 inches in diameter. To equal the braking surface upon a drum in this position would require a drum of 24 inches in diameter on each wheel. Another advantage which a transmission brake has over the wheel brake is that of cleanliness. The locating of the brake in a housing at the transmission effectually prevents road dust and oil from entering it and impairing its usefulness.

TRANSMISSION GEARSET DISCUSSION.

(T. W. F., Middleport, O.)

Will you please tell me the different advantages of three and four speed transmission gearsets? Could a thermostatic control be applied to a Hupmobile, thermo-syphon radiating system with advantage?

The best answer to your first question is that a four-speed transmission offers a greater choice of "power" ratios than a three-speed.

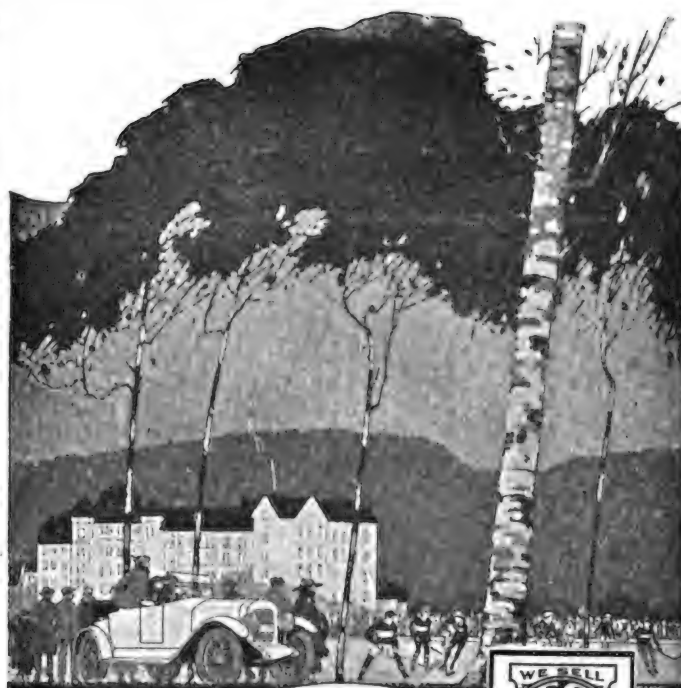
The function of a transmission is to transform speed into power which may be applied through the rear wheels to the best advantage. The gasoline automobile engine is designed to furnish power at a certain speed, which varies in different engines. At speeds lower than the speed for which the engine is designed the output is greatly lessened. To start a car from standing position more power is needed than to keep it going after it has been started. As the speed of the car increases less power is required in proportion.

Assuming that engine speed remains constant, the low speed in the transmission is applied and the speed from the engine is reduced in the transmission and furnished to the wheels at a low speed with more power. Different speed ratios in the transmission furnish more speed to the rear wheels, but at a lower rate.

The transmission gearset really is a cleverly arranged system of levers, in the shape of gears, which give different speed ratios.

With a lever, if the distance between the fulcrum and

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No Day Too Cold for

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The Standard Oil for All Motors

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Manufactured for 16 years—used by millions—the SPLITDORF Plug is the Plug that stands supreme after years of test.

It cannot leak oil or gas
It cannot score cylinders
It can not short circuit
It will not break
It will not burn out
It will not wear out



Do not confuse SPLITDORF Spark Plugs, "The Plug with the Green Jacket," with porcelain cored plugs. The green porcelain jacket is merely a covering—an outer garment for the ruby mica insulation. This mica is wound lengthwise around the core—in such a manner that every explosion tightens it anew and makes it absolutely leak-proof.

The green jacket adds finish—no more. It may be cracked or broken—or entirely missing without affecting the insulation of the mica-wound core or the efficiency of the plug.

**Any SPLITDORF Spark Plug
will outlast any engine**

PRICE \$1.00 Each. You can get them wherever motor accessories are sold.

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Now Get the Best

NEEDHAM TIRE COMPANY

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point of application is very great in proportion to the distance between the fulcrum and the load, a greater load may be lifted with a smaller amount of pressure than if the distance between the weight and fulcrum were larger than between the fulcrum and point of application. However, the speed or rate of movement in the former case is not so great as in the latter. As a comparison you may consider that a transmission gearset is a mechanical arrangement of continuous levers in the form of gears by which the ratio of power application is transmitted.

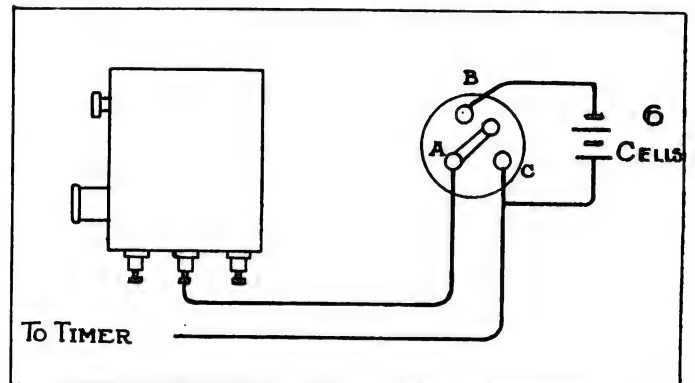
We would not advise a thermostatic control for a Hupmobile, nor do we know of any thermo-syphon cooling system so controlled. Such a cooling system requires an unimpeded circulation and we doubt that a thermostatic control would be practical.

BATTERIES FOR IGNITION.

(J. A. M., Lansford, N. D.)

Will you please give me a wiring diagram showing how I can connect a set of dry batteries with the Ignition system of my Saxon car so that I can use it while the storage battery is being charged?

On the bottom of the coil box you will find three binding posts, a wire leads from one of these posts to the frame, from a second to the engine timer, and the third to both the timer and through the lighting switch, fuses, etc., to the storage battery. The second of the three is to be disconnected from the coil box and connected as shown in our sketch to a two-pole switch. The batteries used should comprise about six cells. When it is desired to use these cells for ignition the switch arm A is turned to the point B; this position permits



Illustrating Method of Connecting Batteries for Ignition.

the battery current to pass through the coil and timer. When the storage battery is used the switch arm is turned to C.

Note the caution plate on generator which says "Never run generator with battery removed nor with wire disconnected from generator."

It is not practical to use dry cells for lighting or starting, so that you will be obliged to dispense with both of these systems while the storage battery is off the car. You may also observe that it is not possible to use the electric horn.

We suggest that you hire a storage battery for use while your own is being charged.

TRANSMISSION LUBRICATION.

(C. T., Fall River, Mass.)

I have a Ford T touring car, year 1913. The transmission is slightly noisy when used on low or reverse. A friend has advised me to use heavy grease in it, which he claims will result in quieter running. Would you advise it?

This advice might well be applied to some of the other makes of cars, but as the Ford car transmission is lubricated by the oil from the engine, it would be very impractical to adopt this means of lubrication. In fact, the result might prove very disastrous.

To understand this better let us describe the Ford system of lubrication. Oil in the crank case and flywheel housing is thrown by centrifugal action into a sort of funnel in the housing of the flywheel. From thence the oil is carried by a tube to the front of the engine, where it is fed into the



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United Chemical Co., Boston, Mass.



Enamel Cleaner,
Applied with a
Cloth. Can Be
Used to the Last
Drop.

splash pan, which is located beneath the connecting rods, and into which the connecting rods dip as the crankshaft revolves, throwing the oil to all parts of the engine, such as camshaft, wristpins and cylinders. The surplus oil drains back into the flywheel housing. The oil from the flywheel case also lubricates the transmission. Now you can see just what effect a quantity of heavy grease would have on such a lubricating system. It would probably result in entire derangement of the flow of oil and possibly ruin of the engine. We do not advise it.

USE OF KEROSENE WITH GASOLINE EQUIPMENT.

(K. C. S. Co., Kansas City, Mo.)

We are conducting a series of experiments, using kerosene and distillate with gasoline equipment. Have tried same with a Chevrolet car and find that the engine runs smoothly with no load, but unevenly when load is applied. What is your explanation of this?

A full discussion of this subject was presented before the S. A. E. and you will find a report of it in this issue of The Automobile Journal, beginning on page 17. The paper which we have reference to was prepared by Mr. F. C. Mock, engineer of Stromberg Motor Devices Co., under whose direction a great number of experiments were carried on and concerning which he reports in his paper.

Your experiments with distillate in a standard Chevrolet car bear out in part what he has to say, namely, that with this fuel, though the engine will run smoothly without a load, it will skip and run unevenly when the load is applied. Such a result is also obtained when the throttle is suddenly opened.

Mr. Mock attributes this condition to a "wet" or "rainy" mixture, such a mixture as would be obtained by using a carburetor of standard type designed for gasoline, and gives as a remedy a possible heating unit construction of the carburetor.

In a paper presented to this same society by Mr. Charles E. Lucke, professor of mechanical engineering, Columbia Uni-

versity, it was stated that kerosene could not be used in gasoline equipment. Mr. Lucke gave the following reasons for this statement:

Bad header distribution between carburetor and the several intakes, resulting in unequal charges to the several cylinders. Excessive washing down of lubricating oil from the cylinder walls, due to its solubility in kerosene, proved by the accumulation of kerosene in the crank case oil.

Smoke and smell in the exhaust, or internal carbon, due to decomposition of heavy unvaporized kerosene drops and wall films, or late vaporizing oil unmixed with air, by the explosion heat of the mixed part.

Misfires and backfires, due to variations in the mixture as a result of varying degrees of vaporization of the oil that passes the carburetor as the engine temperature varies—especially noticeable with changes of throttle, engine speed or load.

Mr. Lucke also states that trouble is due to "wet" mixtures and that the solution is entirely a problem of heating and heaters.

MUFFLER TROUBLE.

(A. E. S., Boston, Mass.)

I have been having quite a lot of trouble with my car recently in that it seems to have little power except when the muffler cut-out is opened. When the cut-out is opened, however, the engine runs all right. Does the opening of a cut-out ordinarily add very much power to the engine?

Your trouble is undoubtedly due to an obstructed muffler. No doubt it has become partially filled with carbon from the exhaust gases which pass through it. It will be a good plan for you to disassemble it and scrape out the deposits. With the muffler clean and unobstructed you will find little difference in engine power between an open and a closed cut-out. It may be possible for you to dislodge a portion of the carbon by gently tapping the muffler walls with a wooden mallet while the engine is running. This part of the car should be cleaned at least once every year if you wish to get good results from your engine.

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ADVICE ON FRONT WHEELS.

(W. E. L., Ballston, Va.)

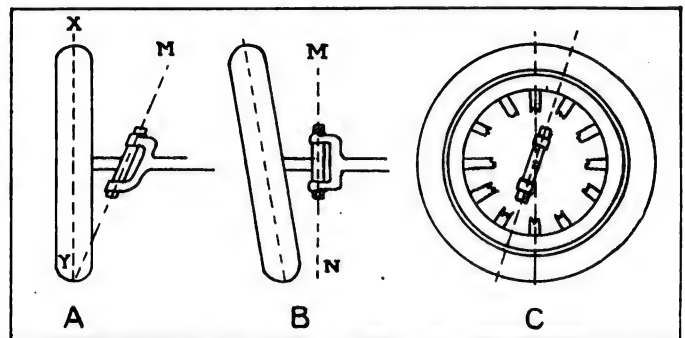
Will you please give me some advice as to the proper setting of the front wheels? Just how the steering knuckles should be in relation to the ground line, etc.

As you did not state the make of your car we can only give you general information regarding the proper setting of the wheels.

The first principle is embodied in the statement, the nearer the centre of the spindle bolt and the pivot point of the wheel are to an alignment, the easier the car will steer. As an illustration of this statement see our sketch "A," which shows the method used by some manufacturers to accomplish this result. In this sketch the line "my" passing through the centre of the steering joint touches the ground at a point coincident with the wheel line of support "xy," which in this case is perpendicular to the ground line. A similar result is obtained by the method shown at "B," in this construction. However, the result is not as ideal as the one at "A," because the line "mn" does not touch the line "xy" at the ground line.

The distance between y and n varies with different cars, as does the distance between the tops and bottoms of the wheels. In the Ford car, for example, the front wheels are about three inches nearer together at the bottom than at the top.

In some of the cars it is considered good practise to adopt an arrangement somewhat as shown in the sketch at C. The steering joint is inclined so that a line drawn through its centre strikes the ground at a point somewhat forward of the point of contact of the wheel. It is essential that such a line



Illustrating Theory of Front Wheels.

strike the ground as above or at the lowest point of the tire's contact face at the ground (perpendicular to the ground). This principle may be best illustrated by the steering arrangement of the bicycle, which conforms to the above theory.

The final principle involved is that of alignment, and as in the other arrangements differs with different cars. The wheels (front) toe in as much as $\frac{1}{2}$ inch on some cars, while on others they are parallel with the rear. That is, the front of the front wheels may be $\frac{1}{2}$ inch nearer together than the rear of the same wheels. The Ford manual says that the front wheels should be in line with the rear wheels and parallel with each other.

DEPOSITS IN RADIATOR.

(O. S., Taunton, Mass.)

For the past few weeks I have been troubled by an overheating engine. I have traced the cause to a deposition in the radiator of a sort of scale. Would you suggest a dilute acid for removing this scale, providing I flush the radiator well after using the acid?

The incrustation which you refer to is due either to impure water and deposits of carbonate of lime, or deposits of the anti-freezing solution which you have been using during the cold weather.

We would not suggest the use of dilute acid as a solvent because the acid would be very apt to start chemical action upon the copper, brass or iron work of the radiator. For cleaning out the water passages you will find that a solution of potash or washing soda will be very efficient. This will

cut the rust, the scale and the deposits, or at least loosen them so that you may be able to wash them out with water. Such a solution will give better results if used hot.

After using the solution (both in the radiator and the cylinder) it will be best for you to flush the passages out with water or steam under pressure. The latter if possible.

REAR AXLE TROUBLE.

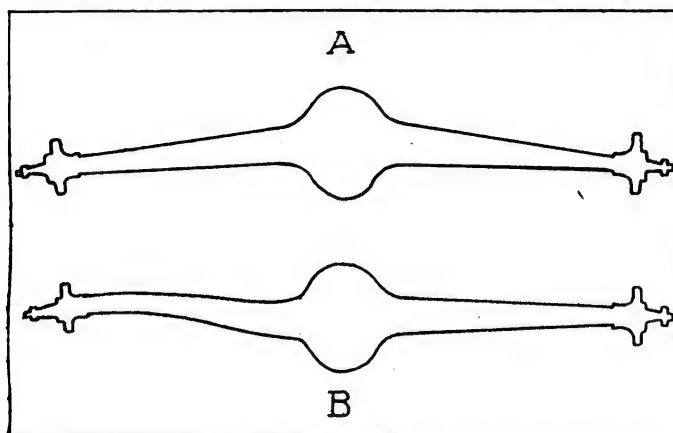
(C. S., Union Hill, N. J.)

I have a car. The engine and transmission seem to be all right, but four, left, rear axles have been broken, one after the other, without any warning. The car will not take a hard grade on anything but low speed. Will you tell me the probable reason for this trouble?

From what you write we should say that your trouble is caused by a faulty rear axle housing.

It is essential that the bearings in the rear axle be in line. If the bearings are thrown out of line by the bending or cracking of the housing, the axle suffers undue strain, which eventually results in a broken part. Such a condition is very apt to result in a hard running car. The sketches are to illustrate this action. At A is shown an axle which is out of line its full length, this condition (which we exaggerate in the sketch) results in undue strain upon the differential. At B we show a case where one side of the housing only is sprung. Such a condition would result in a break in one axle, and we think that your case is similar.

To locate such a condition you may adopt the following method: Obtain a shaft which is long enough to pass



Exaggerated Illustration of Axle Disalignment.

through the rear axle (about five feet long) and of the same diameter as the shafts now in the car. Bolt both housings together with bearings in place and this shaft through it. If a condition such as is shown at A exists you may find it a difficult matter to bolt both halves of the axle together. Or, if you do, you may find that the shaft revolves with a certain amount of resistance. The shaft in this position should revolve freely and at the same time the centres should remain constant in relation to the housing. If a condition exists similar to "B" it will be noted when you try the shaft in one-half of the housing only.

If you find that either of these conditions exist it will be best for you to consult a repair man and have it remedied. A truss rod or brace may be necessary to prevent a recurrence of the same evil.

Such a condition might arise from rivets working loose in the housing at various points. The best remedy is to have these points welded or riveted, preferably both.

TROUBLE WITH ELECTRICAL INSTALLATION.

(J. A. S., Rochester, N. Y.)

There seems to be some trouble with the wiring on my car, the ammeter shows a reading at all times. The only way that I can stop the current from leaving the battery is to disconnect the battery wire. How can I locate this trouble without pulling out all the wiring?

We are sorry that you did not tell us the name of your car for we could then have given you more specific information,

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would learn more about the effect magneto ignition will have on the efficiency of your motor, write now for a copy of "More Efficiency For Your Car."

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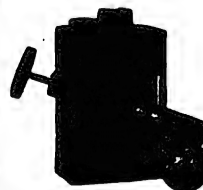
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Safe Garage Heater

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THE 100% PERFECT SPOTLIGHT

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put up in 2½ lb. cans for Ford differ-
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680 "stays put".

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troit, Birmingham, Kansas City, Minneapolis,
Nashville, Salt Lake City, Seattle, Peoria.



as well as a wiring diagram. At the present time there are a great many different wiring systems. You might try the following procedure and if you do not locate the trouble let us know the name of your car and the model or year.

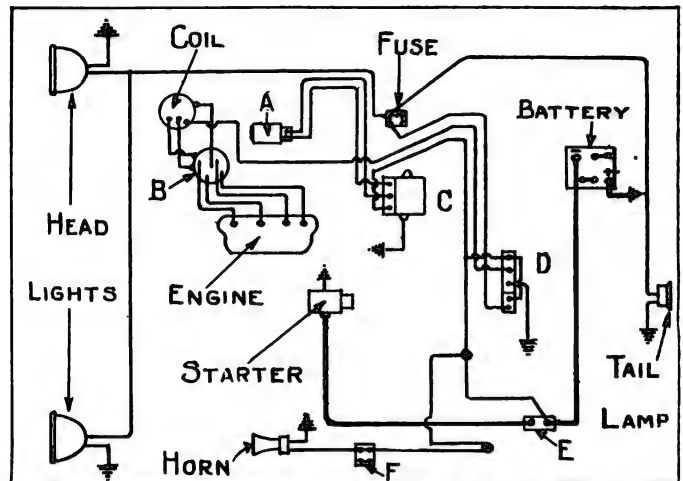
Connect wire with storage battery as originally installed, ammeter shows excessive discharge. Disconnect battery wire at generator and note the result; if ammeter drops back to zero your trouble is in the generator or generator cut-out, possibly the latter. If this is the case you had better have a repair man inspect it before you run the car again. If ammeter still shows discharge, connect wire as before and remove in turn connections at lighting switch, starting switch and fuse panels, replacing connections as before until a connection is found where the excessive charge passes.

Having located the connection through which the current is leaking, trace the particular wire back to the battery and see if there is a ground connection. Carefully inspect points where wires lead through holes in body or frame to see that insulation is not worn off. By following these suggestions you may be able to locate the "trouble" line and remedy it.

TROUBLE WITH SLIPPING CLUTCH.

(C. R., Warren, R. I.)

I own a Dort, model five car. Am having some trouble with the clutch, which frequently slips when the load is applied. Will you please tell me how to remedy it?



Wiring Diagram of Dort Model Five.

Will you please give me the wiring diagram for this model?

On the right side of the transmission you will find a small cam, which is fastened to the clutch pedal shaft and when clutch is engaged rests against the lower side of the rear engine support. The function of this cam is to prevent the brake pull rod from pulling the clutch pedal back against the floor boards. You will notice that by turning the adjustment screw on this cam the clutch pedal is adjusted. See that the set screw is set so as to allow the clutch to go into full engagement, and give about one-quarter inch play to the pedal when clutch is engaged. The clutch pedal should have at least one-quarter inch clearance with the floor board when back in the engaged position; if it does not, it will probably be necessary for you to replace the worn clutch leather facing.

If you find that the clutch slips, but that the leather is not worn, it may be that oil has worked up onto the leather. Be sure that the drain hole under the flywheel is open. Wash the leather with gasoline and then make sure that clutch cone hub and cone thrust bearings are well lubricated. If this does not correct the trouble, remove clutch and examine the cone for high rivets.

After cleaning the clutch leather you may find that the clutch catches harshly. Oil it with neatsfoot oil, but do not use anything else. This kind of oil has a tendency to soften the leather.

(When Writing to Advertisers, Please Mention The Automobile Journal.)

A MAGNETO DISCUSSION.

(A. E. S., Detroit, Mich.)

We have been having a discussion regarding magnetos and would like you to settle the matter. A claims that in order to generate current it is necessary to revolve either the coils or magnets in a magneto before current will be generated. B claims that such is not necessary and that current may be generated without revolving either the coils or magnets. Will you please tell us which is right?

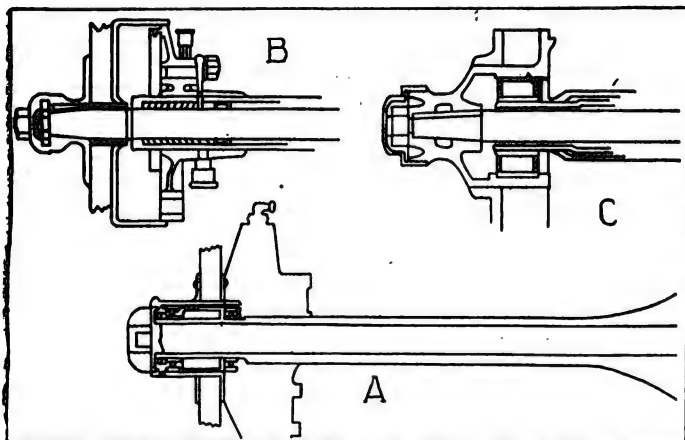
In order to generate an electrical current in a coil of wire magnetic lines of force passing through the coil must be either cut or broken. This may be accomplished by any of the following ways. A revolving coil, cutting the lines of force; revolving magnets, around a coil, causing lines of force to be cut; rapid interruption of lines of force and change of direction of lines of force. B is right, there are a number of magnetos upon the market which have neither revolving coils nor revolving magnets. The revolving member consists of a combination of iron pieces which gather in and change the direction of the lines of force passing through the coil, such action causing a generation of current in the coil.

REAR AXLES.

(C. J., Fall River, Mass.)

Will you please explain the difference between full and semi-floating rear axles?

Present day conventional rear axles are made in two parts. The internal, or driving part, which comprises the



Three Types of Rear Axles Now in Vogue in Pleasure Cars—A, Full Floating; B, Semi-Floating; C, Three-Quarter Floating.

differential and wheel axles, and the external, or stationary part, which is called the housing.

The internal part, through which the power is transmitted to the wheels, is mounted upon bearings. This part must be fastened to the wheels in some manner. In the semi-floating type of axles the wheels are mounted directly upon this axle and weight of the car rests directly upon the rotating part. See illustration B.

In the full floating axle, however, the wheel is supported and rotates upon the outer housing. None of the weight of the car is placed upon the axle, which is simply fastened to the outside of the wheel, as is shown at A.

Both illustrations show the principle.

FIRING ORDER OF KING CAR.

(A. M., Albany, N. Y.)

Will you please give me the firing order of the King model E car? Also the method of setting the spark? This car is fitted with an Atwater Kent Unisparker system and has eight cylinders.

Considering the front cylinder (next to the radiator) of the right hand block as number one, next towards the rear number two, etc., the front cylinder of the left hand block is number five, the next towards the rear number six and so on; the cylinders should fire in the following order, 1-8-3-6-4-5-2-7.

In timing, turn on the hand crank until the piston in num-

(When Writing to Advertisers, Please Mention The Automobile Journal.)

What Is NON-FLUID OIL

—and how does it Save You Money?

NON-FLUID OIL is a scientifically prepared lubricant for gears and bearings that overcomes every deficiency of common grease.

It cannot harden like grease does, therefore is ALWAYS lubricating even in the coldest weather.

It cannot melt like grease does, therefore does not soften and leak out.

It is pure lubricant—ALL of it lubricates. It leaves no gummy residue to clog and rust gears and bearings.

NON-FLUID OIL lasts three times as long as any grease. It kills friction better. It is a trouble-saving, money-saving, car-saving lubricant. NON-FLUID OIL is sold only in orange-colored cans bearing this sprocket wheel trade-mark.

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REGISTERED



All progressive garages and supply shops sell it. Get "K-oo" Special for gears; "K-ooo" Grade for bearings.

Write for a free book on "Lubrication of the Motor Car."

New York & New Jersey Lubricant Co., 165 Broadway, New York

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SIX BODY STYLES

\$850 to \$1325

Write today for complete catalogue and territory information.

Full line of export models for foreign markets. Prices on application.

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"THE TENTH ANNIVERSARY CAR." 3

REGAL-4-THIRTY-TWO

Four Cylinder Motor
Full 33 H. P.
106 Inch Wheelbase

\$745

REGAL MOTOR CAR CO., "Dept. B." Detroit, Mich.

Allen Classic
Motor Cars
The Allen Motor Co. Fostoria, O.

ELCAR

ELCAR

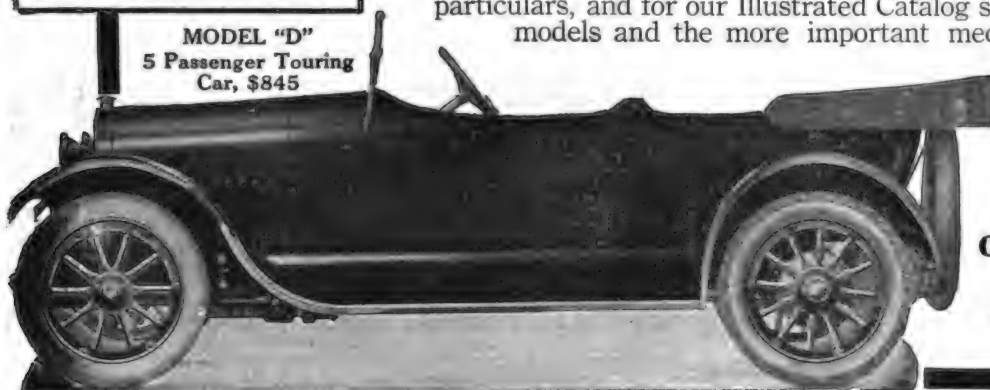
The Elcar at \$845

Does Its Own Talking

A Few Elcar Specifications

Wheel Base—As long as some cars selling up to \$3,000 and more—115 in.
Motor—4-cylinder; long stroke; high speed; 34.7 h. p. at 1,800 r. p. m.
Fuel Supply—Stewart vacuum system.
Ignition—Delco automatic spark advance with manual control.
Starting and Lighting—Dyneto two-unit; double-bulb headlights; Willard storage battery.
Clutch—Dry multiple disk—seven plates, steel on Raybestos.
Rear Axle—Full-floating with roller bearings at each end of wheel hubs.
Differential—Spiral bevel driving gears, with roller main bearings and ball thrust bearings.
Brakes—Internal and external, two inches wide on 12-inch drums.

MODEL "D"
5 Passenger Touring
Car, \$845



Looks better than its price, and is just as good as it looks. A car of distinctive beauty, well designed, well built, well finished—a car in which quality speaks right out.

Three Models at One Price

Five Passenger Touring Car Four Passenger Touring-Roadster
Two Passenger Roadster

Secure it for your territory We want to place our proposition before live dealers in territory not already assigned. Write us for particulars, and for our Illustrated Catalog showing all ELCAR models and the more important mechanical parts, and describing the construction of the ELCAR even down to its small details.

**Elkhart
Carriage & Motor
Car Company**

6811 Beardsley Avenue
Elkhart, Indiana

ber one cylinder is at the top of the stroke between compression and power strokes. Disconnect the spark control rod from the side of the distributor and loosen the set screw on the vertical part of the housing underneath. Turn the distributor slowly backwards, in the opposite direction to normal rotation, until a click is heard. Without moving the unispark-er, tighten up the set screw, then advance the spark lever on the steering wheel, about one-half inch up on the sector, and connect spark control rod with the distributor case in such a manner that there will be no play.

WANTS TO REMOVE CARBON.

(E. O. S., Boston, Mass.)

I have a Studebaker four-cylinder touring car, 1915 model. Will you kindly inform me how to proceed to remove carbon from the valves and cylinders?

Would advise either one of two methods, oxygen or scraping. The first is the most thorough, as it eliminates every particle of carbon. Many repair shops now adopt this method and the charge for the operation is not great.

To scrape the pistons and valves it would be necessary to remove the valve caps in the head of the engine. Because of the limited working space, specially shaped scrapers must be used. Even then it is almost impossible to reach every part of the piston and some carbon is almost certain to remain. You could, no doubt, accomplish this operation yourself. Turn the engine over by hand until the piston in the cylinder to be cleaned is brought to the height of its upward stroke. Use considerable pressure in scraping the piston head. After the carbon is thoroughly loosened, blow it out of the opening. Be sure to screw the valve caps down tight when replacing. A paste of flake graphite and oil smeared on the threads will insure against compression leakage and will greatly facilitate the next removal. To prevent breakage remove the spark plugs and priming cocks before unscrewing the valve caps.

(When Writing to Advertisers, Please Mention The Automobile Journal.)

If the cylinders are not heavily carbonized it may be possible to loosen the carbon by chemical action. At the end of a day's run, when the motor is hot, inject about a teaspoonful of kerosene or alcohol into each cylinder through the pet cocks on the top. When the motor is started in the morning the carbon will be expelled with the exhaust gases.

MIXING ETHER WITH GASOLINE.

(H. W. A., Malden, Mass.)

Is it advisable to mix ether with gasoline so that a richer mixture may be obtained? Will this mixture injure the motor? Can kerosene be mixed with gasoline in equal proportions to produce a satisfactory operating condition?

Would not advise the mixing of fuels, either ether with gasoline to make the latter more explosive, or kerosene with gasoline for the sake of economy. The former mixture is objectionable, being both unsatisfactory and dangerous, while the latter, when the ordinary carburetor is used, will form a fluid having a high vaporizing point and thus actually deteriorate the volatile liquid, gasoline.

Ether is an oxygen carrier, this being the reason for it being suggested by many as an agent which will increase the value of gasoline as a fuel. With the modern heated carburetor, gasoline alone, even though it be of a low grade, should afford satisfactory engine operation. The high price of ether must also be considered. Since the combining of fuels is very seldom done, there is no rule on record for the mixing of the two.

To a certain extent, ether, oxygen, picric acid and other similar oxygen carriers injure the engine by subjecting bearings, crankshafts, cranks and other moving parts to unusual strains for which they were not designed. Picric acid is also said to form a deposit on the cylinder walls, which attacks the glaze and eats into the metal. It is not unlikely that if either ether or picric acid were used they would cause trouble at the valves by attacking the seats.

**WINTON
SIX**

Choosing Your Color Scheme

All the colors of the rainbow are at the command of the Winton Six buyer. Your range of choice is unlimited.

AND if you are in the slightest doubt as to which one you like most, or which will retain its charm longest, or which is best for any particular type of body—if there is any question whatever that experts can answer, let our art department serve you.

We have a staff of color specialists, long skilled in creating combinations of unusual and enduring beauty, and thoroly versed in the tone effects of the automobile art. Their skill is at your service, gratis. It will be a pleasure for them and for us to help you to a happy decision. Simply telephone or drop us a card.

Open Cars
\$2685 to
\$3500

Closed Cars
\$3000 to
\$4750

The Winton Company

131 Berea Road, Cleveland

INDEX TO ADVERTISERS



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are unequalled for motor lubrication, freer from carbon, economical because they protect the motor against mechanical wear, and the quantity required is comparatively small.

These are the claims of thousands of motorists,—some with years of experience, who want full value, and more who know the value of high grade lubricants, and who know when they obtain satisfaction.

EAGLEINE QUALITY IS INSURED TO YOU

A grade for every type of motor. It is sold in sealed containers.

*Let us send you our new book and chart.
It is free at request.*

EAGLE OIL AND SUPPLY CO.

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NEW YORK CITY
Woolworth Building

CHICAGO
1132 W. 37th Street

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GETTING FOREIGN BUSINESS

THERE are today a large number of American manufacturers of motor vehicles who are doing a most satisfactory business in foreign countries. Even as conditions are today, these keen, far-sighted, opportunity grasping, progressive concerns are rapidly perfecting selling channels which will permit them to dispose of a very considerable part of their output.

American products are already established in all foreign countries as standard goods, the best that can be produced. Thousands of foreign trade distributors are specializing in lines that are produced in this country. These are concerns that are well established. They are in a position to transact a large volume of business. This means certainly and distinctly that they can afford service to the buyers in their home field which will compare favorably with the service which domestic distributors supply to their patrons in this country.

Generally speaking, such connections in a foreign country are cash buyers, and, as they are now looking to America as the logical country to supply their needs, it is the opportune time for the producers in this country to explore foreign fields and reach all of the dealers who are in a position to place orders.

TRADE POSSIBILITIES UNLIMITED

The market of the world will soon be open to American manufacturers. It is waiting for American products. It is waiting for American service. There should not be an instant of hesitation. There is nothing mysterious in the act or details of entering into foreign business. The opportunities are unlimited. It is certainly the foresighted manufacturer who is now busily engaged in establishing his lines in the foreign field. Most emphatically he is establishing them on a permanent basis, almost as soon as he has made a beginning.

The way to enter foreign trade is simple. Not as an auxiliary, but as a direct channel, the Foreign Trade Bureau of the Automobile Journal opens the markets of the world to manufacturers. This bureau now enjoys a large membership, including concerns that produce vehicles, parts and equipment. Those who are affiliated with the Automobile Journal Foreign Trade Bureau are in direct touch with more than 8000 foreign dealers, in more than 85 foreign countries. Membership in this bureau is free to advertisers in the Automobile Journal. The great advantage afforded is that all members operate their own foreign departments, yet at practically no additional overhead.

REACH ALL BIG TRADE INTERESTS

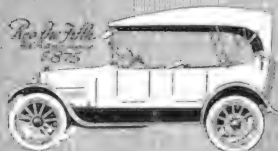
The concerns and individuals reached by the members in this bureau are the leading distributors in their respective countries. Most of them are what we would term importing jobbers, as they buy to sell again and to place lines with dealers who do not import products. This affords the members of the bureau the distinct opportunity to reap golden benefits through the zealous selling efforts of thousands of small dealers whom they could not reach in any other way than through this bureau.

The service is simple, complete and efficient. Besides constantly increasing in its worth to members, it supplies an immediate asset to any manufacturer of great value. It possesses result-producing factors that makes it a big feature in connection with any business that uses it.

The bureau is conducted under the personal direction of T. Wesley Wright, with offices in New York City. His services are free to members. Mr. Wright is without question one of the best informed export men in America. He has developed this bureau to a degree of efficiency that makes it a business proposition of magnitude, wholly serviceable, worthy of the utmost confidence, and that will bring a magnificent reward to those who utilize it. The American manufacturer must realize that a foreign department is the best promotion feature of the day and hour. The time to develop the foreign field is now.



Ten Reo Models —One Reo Quality



REO ENGINEERING is sound engineering. That is now recognized by buyers generally—conceded by other engineers.

REO POLICY is as stable, as sound, and as dependable as is Reo engineering.

THE GOOD INTENT which was the foundation of Reo policy, is still the guiding principle.

REO FACTORY FACILITIES have increased from year to year until now the total area is nearly forty acres—and the Reo factory has long been known in trade circles as "The model automobile plant."

WE REO FOLK make more parts of Reo cars and motor trucks than any other concern in the industry. We believe that statement is 100 per cent true.

IN THE REO LABORATORIES we determine what materials shall constitute every part; here the formulae are worked out—here the tests made to ensure that every pound comes up to the Reo specifications.

THEN WE PUT "Just a little bit more for safety's sake" in every part.

"50 PER CENT OVERSIZE" in every vital part is not a mere catch phrase—compare and you'll find it is a statement of fact.

50% EXTRA STRENGTH is the aim—and we achieve that by using the best of materials and more of them.

NOTHING is left to chance. The Reo guarantee is based not on a guess but on the certainty that the quality is there—determined by the most rigid and painstaking tests.

WE HAVE NEVER BEEN ambitious to make all the automobiles—only the best.

MAKING FEWER WE CAN be more certain of making them better—provided of course, we make enough to enable us to avail ourselves of modern automatic machine tools and the most efficient methods.

THE REO VOLUME long since passed that point.

OUR CHIEF CONCERN now is to see that it does not pass the point where quality gives way to mere quantity considerations—that point where personal supervision gives way to a "system."

BECAUSE OF THAT POLICY there is at this moment, and always has been, an over-demand for Reos of all models.

THAT IS WHY the Reo line is so prized—so coveted—by dealers.

TEN MODELS, comprising the most complete range of touring cars, roadsters, enclosed cars (fours and sixes) and motor trucks; and every model the embodiment of Reo quality and Reo care in the making.

IT PAYS to handle such a line—it costs less to keep Reo owners happy than is the case with any other line, bar none.

Reo Motor Car Company
Lansing, Michigan

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"THE
GOLD STANDARD
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These Are the Manufacturers Who Equip With

AC

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Accept No Plug Unless AC is Burnt Into the Porcelain

Sold Everywhere

No Greater Recommendation Can Be Given a Spark Plug

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Knox	Federal	Sterling Truck
Jordan	G. M. C.	Abbot
Liberty	Gramm-Bernstein	Anderson
Crane	Trucks	White
Simplex	Republic Trucks	Deleo-Light
Stearns	Murray	Phianna
Knight	Bour-Davis	American La-
Saxon	McLaughlin	France
Haynes	(Canada)	Lincoln Truck
Chevrolet	Diamond T Truck	Four Wheel Drive
Dort	Monroe	Acme Truck
Cole	Netco Trucks	Samson Tractor
Reo	Moreland Trucks	Fostoria
Paige	Pilot	Diabrow
Peerless	Paterson	Maxim
Dodge		Old Reliable Truck

ELCAR

A Few Elcar Specifications

Wheel Base—As long as some cars selling up to \$3,000 and more—115 in.

Motor—4-cylinder; long stroke; high speed; 34.7 h. p. at 1,800 r. p. m.

Fuel Supply—Stewart vacuum system.

Ignition—Delco automatic spark advance with manual control.

Starting and Lighting—Dyneto two-unit; double-bulb headlights; Willard storage battery.

Clutch—Dry multiple disk—seven plates, steel on Raybestos.

Rear Axle—Full-floating with roller bearings at each end of wheel hubs.

Differential—Spiral bevel driving gears, with roller main bearings and ball thrust bearings.

Brakes—Internal and external, two inches wide on 12-inch drums.

The Elcar at \$845

Does Its Own Talking

Looks better than its price, and is just as good as it looks. A car of distinctive beauty, well designed, well built, well finished—a car in which quality speaks right out.

Three Models at One Price

Five Passenger Touring Car Four Passenger Touring-Roadster

Two Passenger Roadster

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Elkhart Carriage & Motor Car Company

6811 Beardsley Avenue
Elkhart, Indiana

ELCAR



MODEL "D"
5 Passenger Touring Car, \$845

(When Writing to Advertisers, Please Mention The Automobile Journal.)

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DETROIT

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AUTOMOBILE JOURNAL

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Entered as second class matter, April 15, 1906, at the Postoffice at Pawtucket, R. I., under act of Congress of March 3, 1879.

Ten Cents
a Copy

VOL. XLIII.

APRIL 10, 1917.

NO. 5.

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Treasurer . . . WILLIAM H. BLACK

Secretary D. O. BLACK, JR.

Published the 10th and
25th of each month by the

AUTOMOBILE JOURNAL PUB. CO.

Times Building, Pawtucket, R. I.

IF ANYONE had any doubt about the place of motor cars in the event of war with Germany, the rapidity with which they have been lined up for volunteer services within the past week begins to give a very clear understanding on that score. Cars are seen to be a leading factor in the mobility of the nation for defense. How the motorists of America appreciate this fact is seen in the variety of ways with which they have responded in the era of preparedness measures. Too much is not to be said in public print at this time as to the enumerations and full strength of motor resources. Automobile aid in mobilization, automobile patrols and air patrols, with the navy, are, nevertheless, surely a bulwark against invasion. There is considerable comfort, too, in the government's call to prominent men in the industry in the organization of and production of munitions supply.

IN THE wave of patriotism which has followed the declaration of war, the attitude of manufacturers to the question of war profits means much to the motor car user and owner. The principle stated by organized business is that the basis of supply of government requirements in war and peace from private sources shall be at a rate of profit so low as to preclude a profit interest in war. There should be no sky-rocketing, therefore, on the prices of cars and accessories. The motive necessities of the legion of car users should not, therefore, undergo the treatment which in foodstuffs has made a high cost for ordinary living.

SUBSCRIBERS when giving us notice of a change in location should always supply the old as well as the new address. This is essential, as it both saves time and will guard the subscriber against the non-receipt of issues of the magazine.

THE building of a garage is a problem for many car owners, and it is one of the things that needs special care both from the point of usefulness, for protection against fire and the economies in cost which needs necessarily be taken into consideration. In the interest of giving valuable service in this respect, the architectural department of this publishing company will present in subsequent issues of this magazine complete building plans of one car, two car and larger garages. In addition to complete details for the garage construction, there will be much valuable, specific and interesting matter in relation to the materials to be employed, and specifications covering every detail needed to set going the building of a garage. These are special designs by the architectural department of this journal and they will be free to subscribers to The Automobile Journal.

DESPITE the conditions of defense of home and country forecast as a necessity for the immediate future, a great volume of travel by motors is anticipated for the coming season. There will be much to see far and near. The increase of military movements will naturally call thousands to the main highways in all parts of the country. Decidedly it promises to be an exceedingly busy season for the motorist.

FOR one who is about to buy a car, next to a careful study of the advertising columns of this paper, it will be a profitable thing to peruse the advice of the general counsel of the National Automobile Association. The legal aspects of a sale are specially told with reference to used cars in the section of this journal devoted to legal information prepared for members of the association and readers of this magazine.

UNIVERSAL TRUCK ACCOUNTING SYSTEM

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It affords every detail of time and work of any number of machines, the labor, operating cost, revenue and earnings, with comparisons for any period, in one record book and day card for each truck.

The simplest and most comprehensive record ever conceived, adaptable for use with any method of house bookkeeping or independently, that can be made to serve as part of any method of accountancy.

The most intensely practical system of accounting ever devised, that can be maintained by a girl clerk and which has no limitations.

When you know the exact cost of truck operation and what is earned through the use of any vehicle, you have data of the greatest practical value.

Detailed information at request. When writing state number of trucks in use.

The Motor Truck

TIMES BUILDING

PAWTUCKET, R. I.

MOTOR TRUCK

Construction

Operation

Maintenance

Repair

Care

PRICE ONE DOLLAR

A work that is complete, wholly practical and deals with all subjects as the title implies.

Truck Care
Truck Repair
Truck Operation
Truck Maintenance
Truck Construction

Prepared for
Owners
Operators
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Salesmen

\$1.00 the copy. In combination with a yearly subscription to Motor Truck (the great national authority on highway transportation, issued monthly) **\$2.00**.

This is the only book published dealing with business wagons, it is fully illustrated and represents a wonderful value.

THE MOTOR TRUCK
Times Building Pawtucket, R. I.

Jackson

NO HILL TOO STEEP
NO SAND TOO DEEP

Put your foot on the
throttle of the "Wolverine
Eight" car and you will
know at last what eight
cylinder perfection means.

FIVE MODELS

Five-Passenger Touring Car	\$1395
Two-Passenger Roadster	\$1395
Four-Passenger Cruiser, including five wire wheels	\$1495
(Wood wheels \$100 less)	
Five-Passenger Sedan (Demountable Top, including regular top	1605
Seven-Passenger Springfield Sedan	\$2095

All prices f. o. b. factory.

JACKSON AUTOMOBILE COMPANY

1229 East Main St., JACKSON, MICH.

You will be amazed by the steady flow of power, by the instant acceleration or onrush of additional power without effort. You will understand why you can go from a standing start to 36 miles an hour in nine seconds.

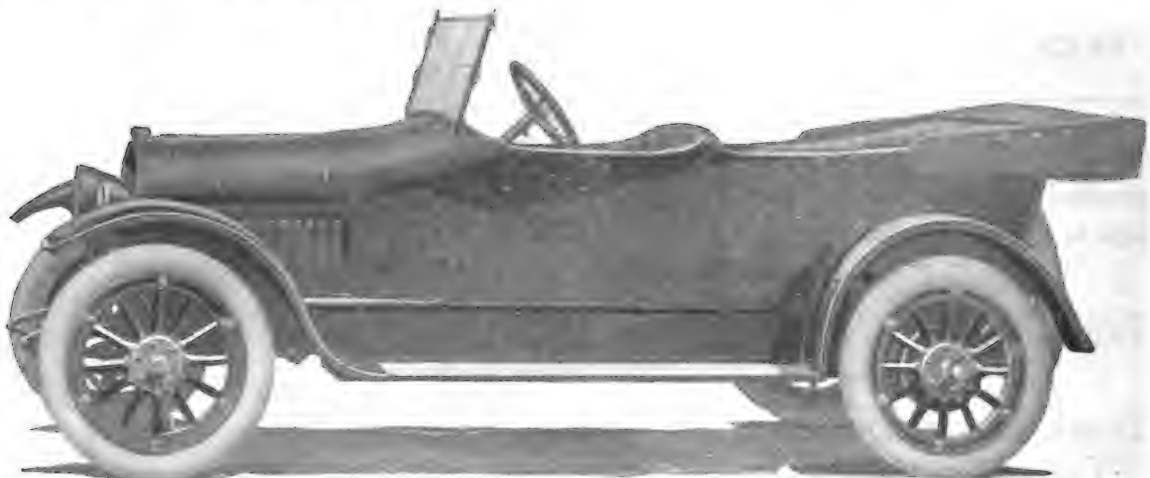
You may think you know power, but, in all sincerity we say that until you've actually ridden in a Wolverine Eight and tried out this valve in the-head Ferro-Jackson Eight, you can have no idea of the possibilities of an eight cylinder motor.

The cylinders of this motor are 3x3½ in. It develops more power per cubic inch of piston displacement than any other motor in the world. It is the most accessible eight built. It is perfectly lubricated. Owners average 17.7 miles to the gallon of gasoline.

Four Full Elliptic Springs Make This The Easiest Riding Car Built

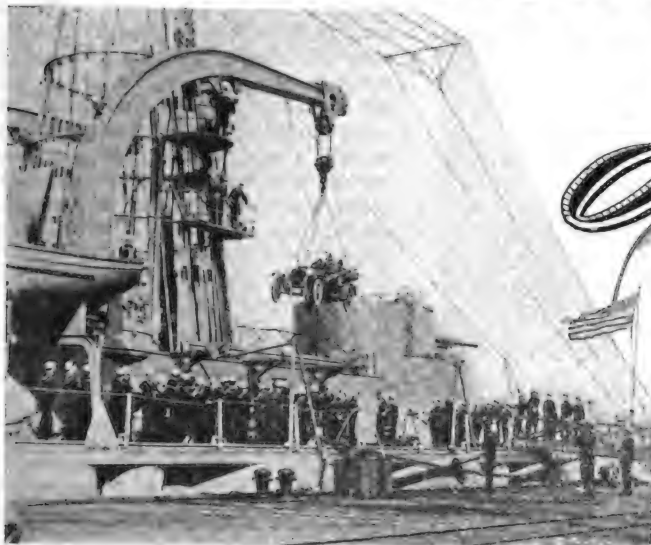
You have read that before, but we can ask you in vain to point to any car equally easy riding. There is only one that approaches Jackson ease of riding, and its price is one-third higher than the Wolverine Eight, and it is not an eight. We challenge any car in the world on this point.

We offer cars of unusual beauty and style, and they are the best Jacksons ever built. We will back every statement with proof. Better order your Wolverine Eight now while deliveries are certain.



(When Writing to Advertisers, Please Mention The Automobile Journal.)

The Automobile Journal



Lining up Motoring America to War's Demands

Mobility Factor on Land and in the Air Is Given First Consideration When the Nation Is Called To Arms Against Germany

PEACE or war is all the same to the automobile, to its new first cousin, the aeroplane, and to the average motorist who guides them. The automobile, no longer a toy nor a luxury, but a necessity of the daily life, rolls leisurely or spins swiftly at the touch of its master's hand, wherever he or she directs that it shall go. Just now, in this land of 100,000,000 people, with a state of war declared by the Congress of the United States to exist with Germany, the motor vehicle is filling both of its offices to a prodigious degree. For the cars of peace are convertible into cars of war and the cars of war are about as busy a line of cars as ever rolled over the roads of America in any month of April in the history of the Republic.

When the first of the month came the owners of upwards of 3,500,000 motor vehicles in America were alert. They were listening for their master's voice. It was sounded in Washington. The President called. His proclamation of the existence of a state of war was dated April 6, thus officially ushering in the fifth war of the United States to be historically recorded as having been begun in the month of April.

In this war, which has now been thrust upon it, the United States has a mobility factor of more than 3,500,000 motor cars in use in the land. When this year's registrations are completed the total may go over 4,000,000, according to the heavy rate of advance notable in the trade. Fifteen states, at least, have more than 100,000 registered motor cars and trucks. New York has just completed a count showing more than 300,000 motor vehicles, while Pennsylvania, Ohio, Illinois, California and possibly some others have more than 200,000.

The production ratio may be affected in the trade by the new war conditions, by the turning of some factories to the making of munitions and implements of war other than motor cars. Yet the vastly increased demand for mobility in

general and of all sorts, predicates at once that the self-propelled vehicle, the necessity of the day in all walks of life, will multiply and wax more plentiful in every hamlet and on every road in the country.

From the ranks of men who pilot the automobile are emerging the pilots of the air who work in conjunction with the navy in the 13 naval districts along the Atlantic, the Pacific and the Great Lakes. Volunteer aerial patrols were begun in Maine more than a year ago and the establishment of aeronautic stations in all of the naval districts is included in the war preparations.

It is interesting to consider for a moment what the mobile conditions have been, just in the history of this young country. In brief, so accustomed has this generation become to being transported from place to place on wheels, that few realize the country's first wars were fought in the period of the wooden wheeled wain; that its life and death struggle with itself was the supreme test for military usage of the large wheeled cannon trundled on an iron-bound axle and that the conflict which is now undertaken marks its own new era of advancements on ball bearings, on roller bearings and on wings. The history of transportation, long, involved and an ever changing curve, is a true record of the people of a nation in their wars as well as in their ordinary daily pursuits in time of peace. It is true, and also to be taken into consideration, that behind the bulwarks of defense, behind the martial lines which will withstand and hold at a distance the enemy, the people live on from day to day. Their pursuits continue; they are hewers of wood and drawers of water, all the while the legions of defense roll on to war. They collect and move food and supplies for those at the front and for themselves all the time.

In the fierce wars of the Middle Ages, the immobility of cannon were their

great drawback. It was Frederick the Great who succeeded in limbering up the gun carriage so that it became wieldy in transport and a heavy contributor to his success in the fields of war. It still had the limitations of weak axles until a genius in England in the fore part of the 19th century succeeded in getting a metal sleeve around the iron axle, and thereby not only increased the mobility of cars of war, but of vehicles for a long period up till the arrival of the automobile age.

So in the Revolutionary days it takes but a moment to recall how the primitive axled coaches creaked their way across New Jersey. From New York, to Trenton, to Philadelphia, the military trains moved—just as the colonists themselves traveled on their journeys before that war—with the most important functionary traveling in the caravan, the fellow with a grease pot in his hand, to smear the axles, encased in wooden boxes, with the all-important lubricant when the bearings ran hot.

In its great wars, in its last war, the American soldier marched. The marching soldier is practically obsolete today. All the marching there is to do is practically of a parade order. From the armory to the railway station, possibly. Otherwise, especially if needed in a hurry, the swift motor car takes him here and there on details of duty. There is still the foot soldier, but practically all his foot movement is afield, although not all of his field movement is afoot by any means. The battle cars of today are afield for all sorts of transporting service, long and short hauls and intricacies of movement which mere contemplation will not realize. The navy, too, takes many an autocar to sea with it. And Verdun, with its motor car fleet in service two months to the saving of Paris is not forgotten.

Then, while the soldier is afield, and the sailor is at sea, there are the countless activities of the folks at home, in-



New Standard U. S. Army Ambulance on White Truck Chassis.

cluding the whole programme of the home guards and home defense. The rising complement to the useful autocar of peace and war is the vigilant and speedy aeroplane. In Europe, in the great preliminary conflict, this newest implement of man's mobility in the created domain of which he is the appointed overlord, has worked out an entirely new science of warfare, and amazingly new lines of practise. The development of their motive force from the same engine which developed the automobile, links them closely in the services of defense and in the development of the man power which guides them. The aviation patrol, the automobile patrol and the naval patrol are linked in a unit of coast defense, each vastly important and when rightly directed making for the security of the people whose coasts are an objective for a wily foe.

Like the minute men of "76," the American motorist did not wait until some one had poked him in the ribs with a bayonet to awaken his patriotism, but had joined mobilization organizations long before President Wilson found it imperative to call the new congress into session. In New York, Pennsylvania, Illinois and throughout the New England states thousands of motorists had registered with some central bureau and were subject to the call for their services. These registration cards in most of the states gave the type of car, kind of serv-

ice that it was capable of and other information in detail that would help to guide the officials that would be in charge of summoning on a short notice a great fleet of cars for mobilization or transfer



Armored Car, Soldiers and Sailors in Indianapolis Parade.

of troops or in doing other service that might become necessary at a moment's notice.

Since the Mexican expedition, perhaps

the first service that the automobile rendered was in carrying Company E of the "Fighting Ninth" of Massachusetts to duty. That company was ordered out on March 28 and a few minutes after being sworn in to the service by Col. Beaumont B. Buck, U. S. A., were whirled away in motor trucks to their posts on guard duty.

The need of these privately owned automobiles and motor trucks and the extent of the service that will be required, is appreciated in the fact that it requires more than 8000 trucks of 1½ ton capacity to maintain the supplies and munitions for a force of 500,000 men such as it is proposed to raise as the first unit of a large fighting force. A division of troops, or 22,000 men, requires nearly 180,000 pounds of food daily alone, which constitutes an enormous haulage task aside from the task of ambulance service and furnishing munitions during a conflict.

While no urgent call has as yet been sent out to the motorists or is there any-

thing immediately in prospect that would require their massed services, the possibilities of such a vast transportation means that they could be called into existence overnight is interesting. Yet many early services have been rendered here and there. The 3,500,000 odd motor cars that are available could carry 15,000,000 troops 20 miles a day, or a larger number than is at present engaged in all the military activities in the great European conflict. This service, however, will only require a small number of machines, as the transportation of troops is not a continuous process to any extent during warfare, but in the other military departments the need of automobiles in case a huge army is mobilized will call for many thousands.

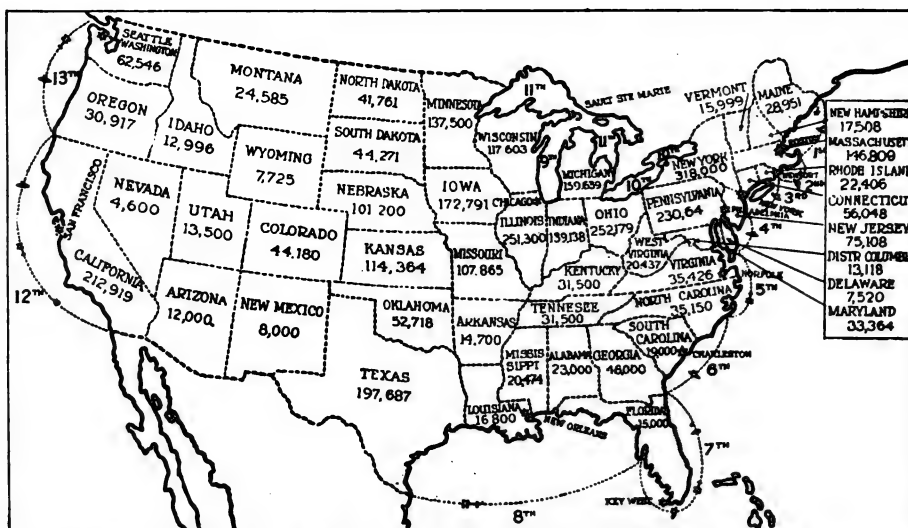
In the signal divisions, dispatch corps and other departments where the men are not called upon to actually engage in fighting, thousands of pleasure cars will be used, while there will also be required thousands fitted with special bodies for



White Wireless Truck, Always in Touch with the Advance Column.

the commissary departments, portable radio stations, machine shops, searchlights and in similar service.

Women motorists have responded to the call in many parts of the country and have organized themselves into divisions that stand ready to furnish their cars and drive them in the hospital service, while in several large cities women have formed classes for the study of the automobile to enable them to take the places of the mechanics in repairing and maintaining automobiles in case the call for troops so depletes the ranks of the repair men that substitutes will be required to carry on their work. The girls engaging in this preparedness work have taken up their tasks in earnest and with all seriousness. These classes are not the result of a temporary fad, but have been conducted with strict discipline and thoroughness of instruction. Many society women joined the classes and while it was a novel experience for them to get all covered with oil and grime, to bruise and lacerate their dainty hands in many



Motor Vehicle Distribution and the 13 U. S. Naval Districts.

ambulance and Red Cross services, but in the fields and on the highways as duty may point the way.

12 hours.

Class B—Trucks to be ready at 48 hours notice for 30 working days.

Class C—Touring or runabout cars to be ready on six hours notice for three working days.

In Connecticut the appeal to motorists was sent out on a registration blank, a fair type of the activity from one end of the country to the other, into which the onward trend of the events of the last three years has gradually but surely evolved.

Now, when the average citizen approaches the railway station in an inland town of a morning he gets his first glimpse of war. He sees a young militiaman attired in an olive drab overcoat and shouldering a gun on guard duty. Far off on the coast lines, however, are the shore and sea patrols. The vessels and shore are served with air scouts and both are served by automobile patrol and automobile supply systems.

To summarize briefly: Over night the United States turned from peace to war; and, behold, the soldier, the sailor, the motorist and the aviator are on the job.



French Troops in a Bombarded Section of Verdun Getting Supplies.

places, but few dropped out during the courses, the majority persisting until they had mastered the intricate mechanism of the modern automobile and learned to repair tires or fix any other part that is required to keep them in running condition.

Eighteen thousand English women are now driving ambulances in France. Many more thousands of their sisters are driving the family car to market, and delivery cars about the towns and villages. It was their proficient work that appealed strongly to American women and pointed the way to service in the motor car field. In its broadly human aspect it recalls to the great-grandmothers of today how they turned to the every day tasks which involved the use of horses and vehicle in the Civil War times of 1861 to 1865. If they did not know how before, they learned to hitch and drive, and some to plow and some to reap. Again they are ready to do their part, not only in the

The Massachusetts Committee of Public Safety asked for offers of motor cars under the three following classifications:

Class A—Motor trucks to be ready at six hours notice for use for one day of



Philadelphia Women with White Army Field Wagon.

Current Interesting Items Told in Graphics

Two juvenile financiers of Philadelphia in an attempt to raise some quick and easy cash from the insurance companies by setting fire to their car, which had been insured for \$500, fell into the hands



of the law. When asked why they should be shown any leniency for such a crude system of acquiring the wherewithal, they stated that they had become tired of paying the high prices for gasoline and decided to get even somehow.

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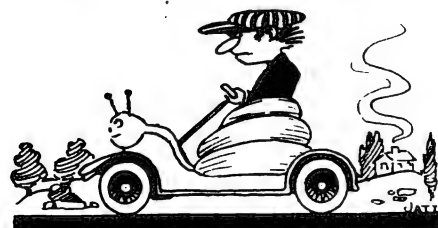
Just why the ownership of or the association with a motor car should have inspired human beings with a wild and riotous desire to cut up has never been explained by the psychologists, but nevertheless, such seems to be the case, as shown by the many joy rides and hilar-



ious stunts of the speed maniacs that bring them to grief. Thusly is the effect of this peculiar influence shown on the owners, but it also recently manifested itself at a gathering of automobile dealers in a Chicago hotel, where it became necessary to call out the police to suppress the exuberance of joy and spirit that the banqueters were manifesting by making targets of the cabaret performers for their too accurately directed buns and other provender of the feast.

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In Texas the legislators have amended the state highway law regulating the speed of automobiles and fixed the limit at railroad crossings to a snail's pace, six

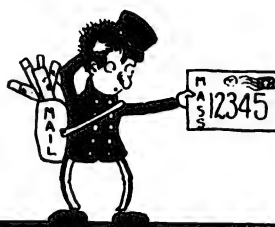


miles an hour. Twenty-five miles per hour is the maximum and is permitted only on country roads. Eighteen miles per hour is the limit in residential sections, and in small cities the maximum is 15 miles and in large cities 10 miles. The

new bill also provides for licensing chauffeurs and prohibits glaring lights.

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The man who drew the pictures of a bumble bee, a person's eye, a man drowning, George Washington eating two apples and a bean pot on an envelope and deposited it in a New York mail box, receiving an acknowledgment from B. I. Drown, 82 Washington street, Boston, Mass., has been outdone by the fertile genius who recently mailed a letter addressed to the automobile tag, "Mass.



12,345." The postoffice clerks called up the state roads department and finding that the number was held by James W. Holt, 153 Allston street, West Medford, Mass., delivered the letter to him. This address, however, was not used as a joke, but was all the address the sender could obtain, having seen it in a list of registrations published in a newspaper that reached him on the Island of Aruba, in the Dutch West Indies.

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When a jitney driver was recently arrested in Philadelphia for violating one of the traffic laws a fine of \$5 was imposed, which he settled with the payment of 500 pennies. He was allowed to depart after the clerk had duly recorded the payment, but when the justice who presided at his trial heard of the transaction he felt that the defendant was poking fun at the dignity of the court and dispatched a sheriff to return the man to the court house. In explanation of his act the jitney driver stated that when he

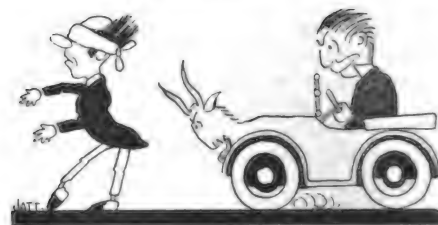


left the house to come to court there was no other money available except the pennies which he took from his child's bank, and that he had no intention of offending his honor's dignity. The judge evidently took the explanation with a grain of salt, as he sent the defendant out in the custody of a sheriff to have the heavy load of coppers changed into bills.

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Since an enterprising citizen of Johnstown, Penn., has proposed the erection of a large garage in that city with the

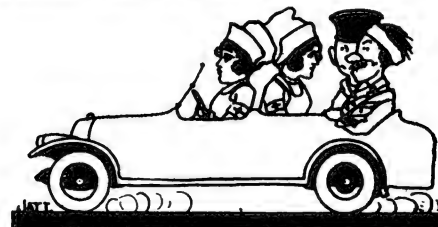
spacious top floor devoted to the use of fraternal societies, several members of the organizations that intend to use the quarters for their meetings, are seriously considering the substitution of automo-



biles for the time honored goat in initiatory exercises.

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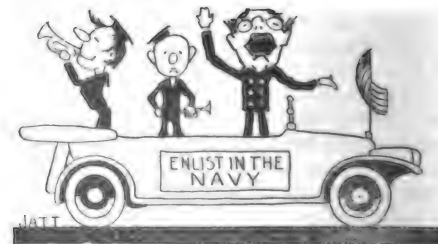
The expression, "I had rather be a live coward than a dead hero," is particularly tabooed at this time and if it was ever translated into French it is doubtful if it has any standing in the parlance of the soldiers who, while heroes, are not dead ones, but wounded, and they have much to compensate them for their sacrifices. Just at present these brave men who are at the hospitals in Paris are being lionized by the French society women, who have abandoned their tea



parties and dances for drives through the suburbs in their automobiles accompanied by one or more of the wounded men. The "Club Feminin Automobile" has been founded by these women, most of whom drive their own cars on these trips.

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The officers of the navy attached to the Charlestown Navy Yard that have the recruiting work in charge have hit upon a novel and efficient method of producing results in their campaign. With a number of private cars that have been placed at their disposal by the residents they have toured the city of Boston and surrounding places, accompanied by buglers,



and with placards on the cars announcing the object of the meetings. When a crowd has gathered about the cars the officer in charge explains that the navy is in need of about 14,000 men to bring it up to its full quota of 76,000 men.

Industry Well Represented in War Organization.

HOWARD E. Coffin, president of the Hudson Motor Car Co., and one of the leading members of the Council of National Defense, has been appointed a member of the general board of munitions in charge of supplies. Frank A. Scott, a manufacturer of Cleveland, O., is head of the new board.

well known men in the automobile business that will give valuable personal aid in behalf of the nation. The big organizations that are identified with the automobile industry will be represented by men who undoubtedly will take a very active part in making available all America's resources for the conflict.

ber of the Council of National Defense almost since its inception.

Alvan T. Fuller, the well known Packard distributor of Boston, who was elected to Congress from that state, was given a great ovation by his several hundred employees when he left the Packard headquarters to take his seat in the



Howard Coffin, Member of Council of National Defense.



Andrew L. Riker, Chief Engineer of Locomobile Company of America.



Alfred Reeves, General Manager of the N. A. C. C.

Mr. Coffin, past president of the Society of Automobile Engineers, and one of the most prominent members of that organization, has been devoting much of his time during the past 10 months to statistical work, compiling a comprehensive and exhaustive industrial index of American manufacturers to be used in aiding the government in the present crisis. Under his direction a questionnaire was sent out to 30,000 manufacturers in different lines and replies have been received from over 27,000. With these on file the authorities have at hand an immediate source of information concerning the equipment of all these manufacturers and what they are best suited to make to supply the governmental needs.

While Mr. Coffin is more prominently identified with the immediate work of preparedness, he is not alone among the

Roderick Stephens, president of the Motor Truck Club of America, headed a delegation which went to Washington recently to confer with the officials. The other members of the party were Coker F. Clarkson, general manager of the Society of Automotive Engineers; Anfred Reeves, general manager of the National Automobile Chamber of Commerce. The mobilization of motor trucks for the army, if such a movement is deemed expedient, will be planned by these men along lines that will involve the least confusion and the most effective organization.

Andrew L. Riker, chief engineer of the Locomobile Company of America, is another prominent man in the preparedness movement, he having been a mem-

ber of the Council of National Defense almost since its inception.

R. D. Parker, Mr. Fuller's general manager, and C. Robinson, sales manager of the big organization, summoned Mr. Fuller to the second floor of the Packard building on Commonwealth avenue, just before his departure for the train, where there were gathered the 300 men and women from the different departments of his organization.

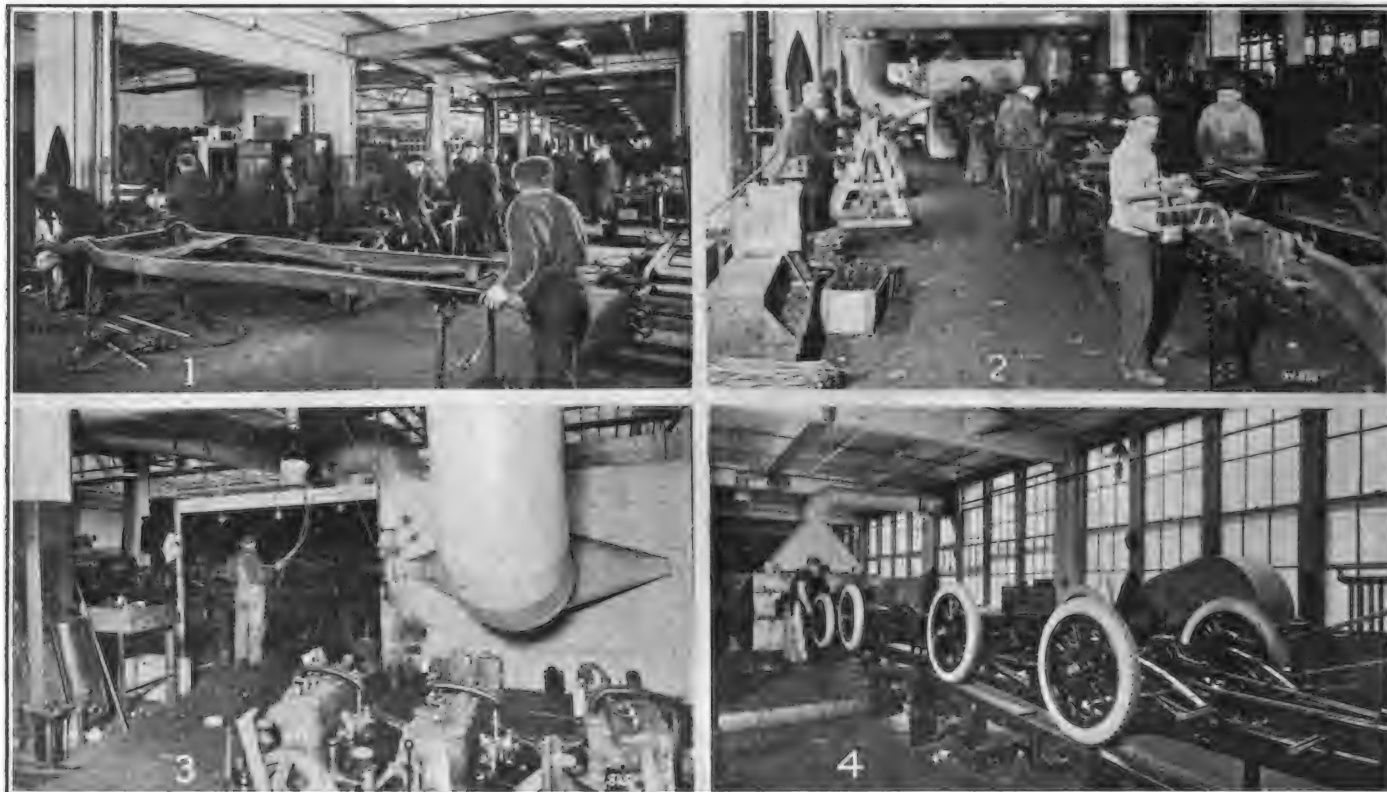
Mr. Robinson, acting as spokesman for the employees, congratulated Mr. Fuller on his election and presented him with a marble statue of "winged victory" as a token of esteem. Mr. Fuller responded briefly, saying that he would do his duty as he saw it and that he trusted he would return from Washington retaining the friendship, confidence and respect of everyone.



Congressman Alvan T. Fuller of Massachusetts (X) Departing for War Session.

Automobile Assembly a Miracle of Industry

Progressive System Used in America's Foremost Vehicle Factories
Effects Marvels in Efficiency and Promotes Tremendous Economies



1—Placing Rivets in Frame at Start of Conveyor System, Chalmers Assembly. 2—With Frame Upside Down, Springs, Running Boards, Brackets, Etc., Are Attached. 3—Painting the Chassis at Entrance to Baking Oven. 4—Wheels Attached, Chassis Still Reversed.

EFFICIENCY in an automobile factory is a well known phase of the automobile industry and has undergone its greatest development and attained its maximum effectiveness in the shops of America's foremost manufacturers of motor cars. Most everyone has heard of the progressive assembly system that is used by all manufacturers in producing their cars. Those intimate with the business understand what this system is and most everyone has a vague idea of how it operates, but those who have never seen it in operation could not possibly imagine the effectiveness and marvelous efficiency of the system, or the tremendous economies that have resulted from its adoption.

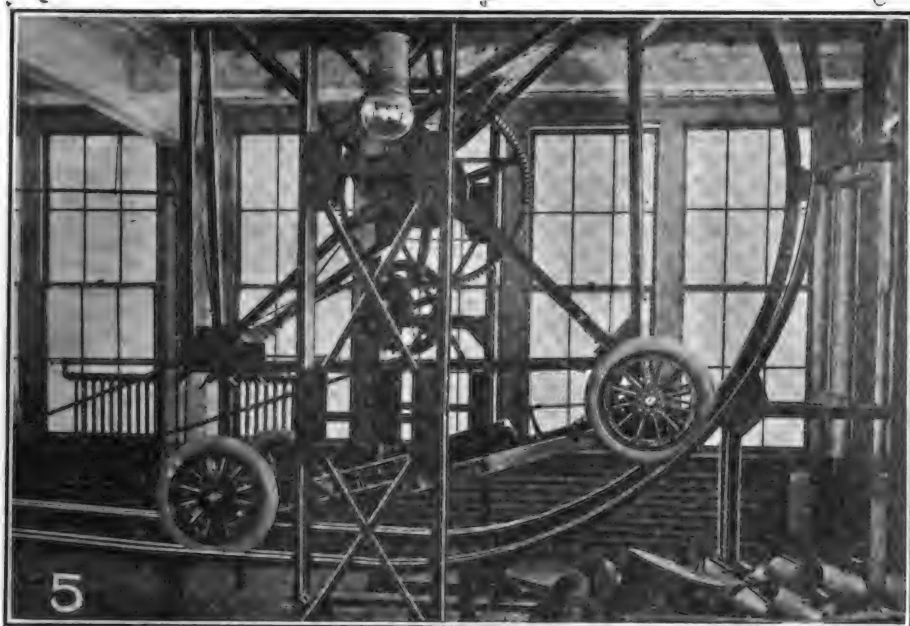
The development of this system to its present high state of effectiveness in plants of both the high class as well as the low priced car manufacturers, has resulted in the reduction of the selling prices to figures less than one-third of what they would have to sell for unless the economies made possible by the process were possible. It has also made possible the high wages that are paid to the motor car mechanics working in these factories, and the enormous output as well has brought the car within

the reach of thousands that otherwise could not become owners of automobiles.

To witness the progressive assembly system in operation is almost like observing a miracle if such a thing were possible. It is really a chain or conveyor system as it passes along, picking up one unit and continuing to collect other units in its travels until a whole motor car, ready for the road, is assembled, and leaves the chain to be driven to a shipping point under its own power. In the system here illustrated, which is used in the plant of the Chalmers Motor Co., the first company manufacturing a medium priced line of cars to adopt the system, the conveyor on which the assembly progresses is 800 feet in length. This chain is endless and when it swings through at the lower end of the first floor a bare frame is placed upon it upside down. The running board, supports, mud pan and braces are riveted to the frame and the springs and axles are attached at this point. As the chain moves on the chassis is carried into the spraying chambers, where it receives a coat of paint on two sides in rapid succession. It next passes to the baking oven and then to a point at the other end of the building, where the wheels with tires are attached.

The next stage of assembly is on the second floor, where the chassis is carried by a specially designed device styled a "ferris wheel," operated by an electric motor. This wheel, which is really a square revolving on an axis, takes the chassis, which is still upside down and, running in steel flanged tracks, forces it around a loop that places it on the second floor right side up and resting on a conveyor chain again. At this juncture the assembled power plant is swung from an overhead crane into its proper position in the chassis and bolted into place. The chassis, which has now taken on a recognizable form as an automobile, is next fitted with fenders, steering wheel and radiator. With these parts properly placed and attached, the car is ready for its important addition, the body, which is brought into position over the conveyor by a crane on an overhead track. This is all done in less time than it takes to tell about it, and the top and side curtains are installed. The finished car is now at the end of the conveyor chain and as soon as it has passed final inspection it is taken in hand by a driver, who pilots it over to the shipping platform.

The method of passing the chassis



5—Chassis Lifted to Second Floor and to Upright Position by Ferris Wheel Device.

frame along upside down during the early stages of the assembly has greatly improved working conditions for the assemblers, as it has made it possible for them to work in an erect position. They do not have to lie on their backs under the chassis at any time, and only at one point work underneath the car. This becomes necessary when fastening the body bolts, but pits have been provided at this juncture in the assembly, so that the men can do their work standing erect.

At present the company is turning out 100 cars per day and the average time for a complete assembly of a car from the

time it is first put on the conveyor chain until it has been driven to the shipping platform is about three hours.

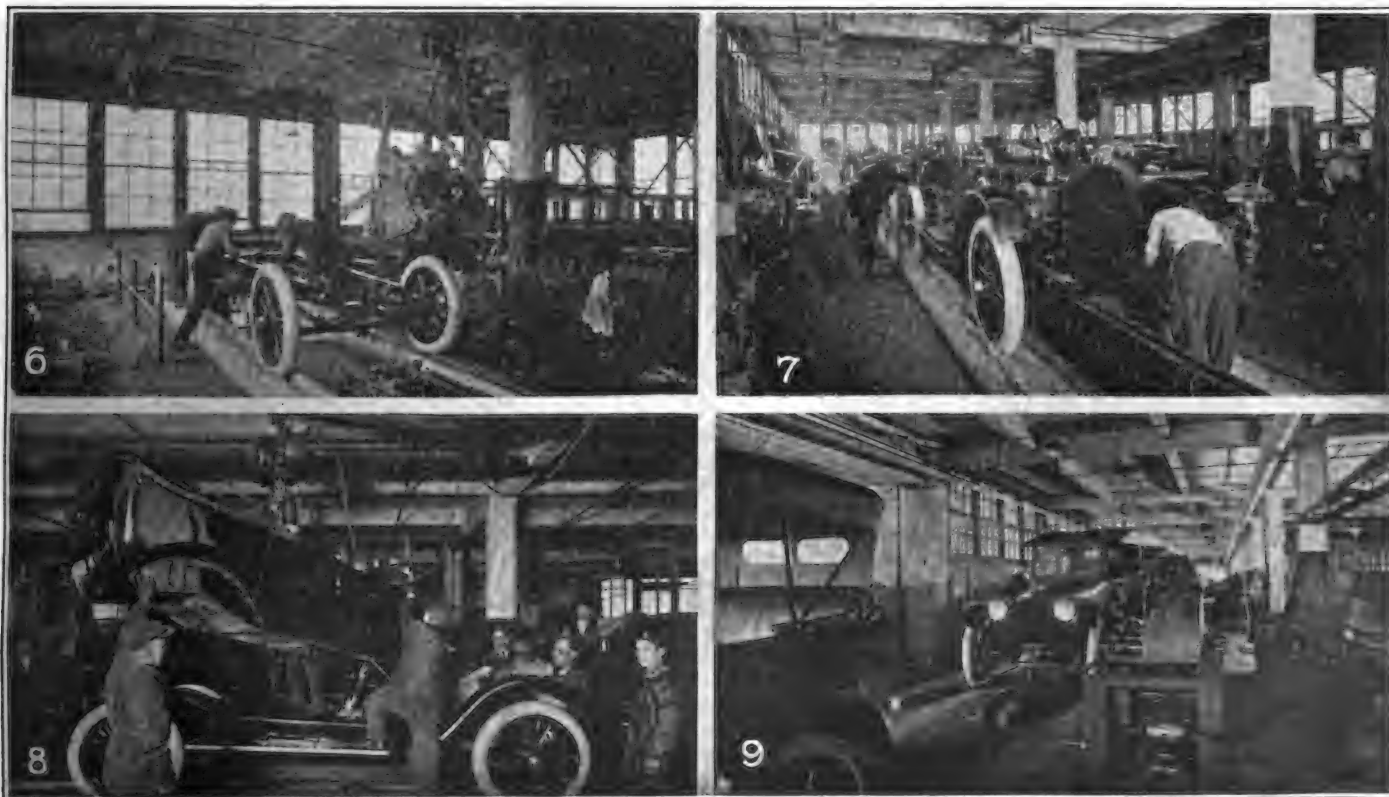
This same system with some modifications and different setting and with widely varied speeds, is used in the large plants where the low priced cars are made, and also in their assembly branches in different cities. At Indianapolis one of the branches has been turning out 150 cars every eight-hour day with 35 assemblers, while at Long Island City another assembling plant builds 165 cars every eight-hour day with 55 men. The Indianapolis assembly means a com-

pleted car every two minutes and 12 seconds. Not allowing for the time the cars are in transit from one workman to another in some shops its pause is little less than $3\frac{1}{2}$ seconds at each stop.

A description in words of the efficiency of this really marvelous system does not suffice to give the uninitiated a true conception of what it is. Only personal inspection can bring to one's mind an idea of the extensive thought and labor that has been expended in creating this seemingly impossible institution, which has revolutionized methods of making machine products. It has done away with the "jack-of-all-trade" and his inefficient methods. Each man does one thing over and over again. He is proficient in that specialty, can do it quickly and always with the least possibility of error. There is less overseeing necessary, less confusion in the factories and less lagging as a man's work is put right in front of him. It does not wait until he decides to take it up, but automatically comes in front of him and must be done immediately and quickly, as he is a cog in the slowly turning wheel, hence, unless he moves, the whole apparatus and organization is thrown out of tune.

Progressive assembly did not originate in the automobile industry, but when the geniuses that built up this business undertook to adapt it for their own purposes they found many difficult problems for solution that had not been encountered by pioneers employing the method.

It seems that it is the last word in economizing on the production of automobiles, although it is understood that one manufacturer has already conceived a method of handling his raw materials that will effect a big saving on his cars.



6—Chassis, Now on Second Floor, Receives Power Plant. 7—Putting on Fenders, Radiator, Etc. 8—Body Installation. 9—Car Run Off Conveyor Chain on Own Power, Passed by Final Chalmers Inspectors and Ready for Shipment.

Smart Spring Styles Shown For Motorists.



Above all things the woman who motors must needs have a suitable and comfortable hat. A fetching B. Altman & Co. model, shown here, is in a cherry colored Palm Beach straw, with facing of satin in self tone. The only trimming consists of a deep silk tassel and a band of grosgrain ribbon.

IN MOTORING styles a more interesting display of Spring coats has never been shown, according to the leading fashion houses. Numerous smart models have been exhibited in which the detail arrangement of trimming, pockets, etc., are the distinctive features. While the fashionable shades run about alike, these coats often appear similar, but the wearer finds an extraordinary variety in their details. In the coat model at the right, one of these shown by James A. Hearn & Sons, the square pockets, pearl buttons and convertible collar all add to the smartness of the garment.



With the coming of warmer weather flowing scarf veils for automobilists are again putting in an appearance. The one illustrated here shows only one of the many fetching ways a veil may be used to good effect for both appearance and comfort on the tour.

Photos by Joel Feder, New York.



Some stunning large check fabrics are used in very distinctive topcoats, as in the model in the centre. Conspicuous among the color combinations is the simple black and white mixture. The one illustrated is a coat showing a smart belt effect and deep, novelty pockets. Black broadcloth is generously used to trim the convertible collar, cuffs and pockets.

Gold crossbar velour makes up very attractively in the smart motor coat shown on the left. The lines are quite straight, though there is ample fullness throughout the garment. Deep pockets, ornamented with novelty bone buttons, and the convertible sailor collar are especially interesting.



N. A. C. C. Training New Automobile Draftsmen

Technical School Taken in Charge by the National Automobile Chamber of Commerce, Which Broadens Scope to Help Bodymakers

THE National Automobile Chamber of Commerce has voted to take charge of the Technical School for Automobile Draftsmen and Mechanics and will broaden its scope for the purpose of supplying more and better draftsmen to the manufacturers of auto-

mobile bodies, which has become such an important department in the industry. This school has been conducted for 37 years in New York City and is open to all employees of automobile or body manufacturing plants.

mobile bodies, which has become such an important department in the industry. This school has been conducted for 37 years in New York City and is open to all employees of automobile or body manufacturing plants.

In the past few years the headquarters of the school has been at the Mechanics Institute, 20 West 44th street, where day and evening classes have been conducted without expense to the pupils. Besides those that attend the classes in person there are more than 250 men taking the correspondence course. Graduates from this course are placed with factories that are in need of men with this kind of technical training.

Charles Clifton, president of the Pierce-Arrow Motor Car Co.; H. H. Rice, treasurer of the General Motors Co., and Alfred Reeves, general manager of the N. A. C. C., have been appointed members of the committee in charge of the school and will work with Daniel T. Wilson, its chairman, to enlarge the size of the school during the coming year and will extend the scope of its operations.

There are three distinctive classes in the school: The introductory or free-hand class, the class for the study of descriptive geometry and the class for scale and full size working drawings. The studies include the following: Linear designing, including free hand, scale and full size drawing; geometry, applied to automobile body construction and known as the "French rule" of

drafting; complete automobile body drafting; perspective and colored drawing of automobiles.

Andrew F. Johnson, who has been instructor of the school for 25 years, is in charge of the correspondence department, which is to be broadened, with the

ment on the seven per cent. cumulative preferred stock. The company is preparing plans for a large addition to its present plant which will double the production capacity, with a corresponding increase in the working force employed by the company.



Day Students at Work on Full Size Drawings.



Evening Class at Work.

same nominal fee of \$8 and \$10, according to the series of lessons that are taken and which is the only charge in connection with the school, the day and evening classes being free.

A total of 124 lessons are included in the correspondence class. When the tuition fee is received by the Technical School for Automobile Draftsmen and Mechanics, 20 West 44th street, New York City, all lesson papers for the term are mailed to the pupil so he may see to what lessons are tending.

At the end of each series of lessons written examinations are required to test the progress and proficiency of pupils and at the close of the course diplomas are awarded to those deserving such recognition.

All employees of manufacturers of automobiles and automobile bodies doing business with the United States and Canada are eligible to membership in these classes of corresponding pupils.

CRANKSHAFT COMPANY WILL DOUBLE OUTPUT.

The net earnings of the Automobile Crankshaft Corp., Detroit, Mich., for 1916, were \$137,488.81. The total assets of the company on Dec. 31, 1916, were \$436,267.95, and the current assets were \$181,786.46, of which \$92,239.14 was cash.

A second dividend at the rate of seven per cent. per annum has been declared on the common stock and a similar pay-

ANTI-FREEZE MIXTURE IN DOBLE STEAM CAR.

Spectators inspecting the Doble exhibit at the New York and Boston shows were surprised to learn that an anti-freeze mixture was used in the water to keep it from freezing in the winter. Mr. Doble explains that alcohol is mixed with the water, just as in a gas car. Since all the steam is condensed the alcohol is not lost and a comparatively small amount will last all winter.

COLUMBUS, O., TO HAVE SPEEDWAY.

A number of well known citizens of Columbus, O., have formed the Columbus Motor Speedway and Horse Racing Company, which will be incorporated for \$200,000. A site has already been selected, a two-mile automobile speedway will be built and also a horse racing course. The president and general manager of the company is John Y. Bassell.

CROW-ELKHART PRICES ADVANCED \$50 A CAR.

The Crow Motor Car Co., Elkhart, Ind., has announced that the price of the Crow-Elkhart automobile, both touring car and Cloverleaf roadster model, would be advanced to \$845, an increase of \$50 per car, effective on April 15, 1917.

Air Defenders From Auto Field

Aviation Training Station Centrally Located in Indiana—W. E. Stalnaker on the Federal Board

IN THE government plans for aerial defense Indiana has taken a prominent part. The state has an aeronautical committee which is in charge of the establishment of an aviation training station at Fort Benjamin Harrison. Besides making this a central point in the translation of auto drivers into air men for the government service, the committee is in active co-operation with the Federal government in its aerial defense plans.

W. E. Stalnaker, vice president of the Pathfinder company of Indianapolis, has been appointed as Indiana's representative on the national committee on aerial defense. The appointment was made by Governor James P. Goodrich of Indiana,

been manufactured by the Du Pont companies on a large scale, including benzol, wood oil, fusel oil, naphtha, ethyl and other materials entering into the manufacture of paints, varnishes and pigments.

The Du Ponts paid \$5,700,000 in cash and assumed all the outstanding obligations for the Harrison company, which has been merged into a new corporation to be known as the "Harrison's Inc.," a charter for which has been applied for by the incorporators: Lammont Du Pont, Dr. Charles L. Reese and Charles A. Meade of the Du Pont company; A. R. Glancy and Wm. Richter, secretary of the Harrison company.

The Harrison plant on Grays Ferry

Frank H. Parker, vice president, and L. G. Schertl, secretary-treasurer. These officers, together with the following men, constitute the directorate: Frederick Gettleman, Faustin Prinz, Adam Mayer and C. P. Bossart.

F. W. Apel, who has been with the company for several years, has been appointed assistant sales manager.

ELECTED VICE PRESIDENT OF DUNLAP-WARD CO.

Maxton R. Davies has been elected vice president and secretary of the Dunlap-Ward Advertising Co. and will continue in charge of the Detroit office, where he has been manager for a number of years. Mr. Davies has been in the advertising business for over 15 years, having been connected with the J. Walter Thompson Co. of New York and the Brownell-Humphrey Advertising Co. He was commercial editor of the Motor World for two years and was at one time advertising manager of the Peninsular Stove Company of Detroit, Mich.

CHALMERS CAR SETS AUTO TRAFFIC MARK.

A Chalmers car, driven by several different men, covered 586.8 miles about the streets of Chicago during the 24 hours between 12 o'clock Monday and 12 o'clock Tuesday, March 27, establishing a new record for that period. The test was held under the sanction of the American Automobile Association. L. A. Hillman, the official observer of the organization, rode in the car throughout the course of the trip.

In preparing for the run, which eclipsed the previous record by 228.1 miles, the first and second gears were removed from the car, leaving only the high and reverse gears. The motor was not stopped once throughout the 24 hours and the gasoline consumption averaged 13 miles to the gallon.

The best previous record for 24 hours running in a city was made in London by a Vauxhall car, which covered 251 miles on a test trip made in 1914.

CHICAGO ASKS FOR 500-MILE CONTEST.

The owners of the Chicago Speedway have applied to the A. A. A. contest board for permission to stage the 500-mile speedway classic at the Chicago course. This race, which was scheduled for the Indianapolis Speedway for Decoration Day, was called off by the officials of that track on account of the strained foreign relations with Germany. The Chicago officials will call off their 300-mile event, which is carded for June 9, if they receive permission to stage the 500-mile classic.

AUTOS IN VIRGIN ISLANDS.

In the Virgin Islands, lying just east of Porto Rico, acquired from Denmark by purchase, the latest register shows 24 cars and three trucks



Aeronautical Committee of Indiana: W. E. Stalnaker, Vice President of the Pathfinder Co., Seated Beside Chauffeur. Other Members from Left to Right: Harry C. Stutz, President Stutz Motor Co.; Charles E. Coffin, Indianapolis Star; Adj. Gen. Harry B. Smith, Medos Gravelle, Assistant Sales Manager of the American Air Craft Co., and Gov. James P. Goodrich.

who also appointed the members of the aeronautical committee of that state.

DU PONT COMPANY BUYS HARRISON BROS.

The Du Pont Co., Wilmington, Del., has purchased the Harrison Brothers & Co., Inc., of Philadelphia, one of the oldest paint manufacturing concerns in the world, having been established in 1793. No changes will be made in the product of the paint company and it will be continued in operation by practically the same organization as heretofore.

Through the Du Pont interests, however, resources and experience will be brought into the organization that will lead to rapid expansion in the manufacture of paints, colors, varnishes and pigments, as well as chemicals. It is not a new line entirely, however, for the Du Ponts, as they have been manufacturing and selling a number of enamels, lacquers and similar articles for some time. The basic materials for this product have

road, on the Schuylkill river, covers 40 acres, on which there are 80 buildings. Notable among these is a model lead plant with annual capacity of 10,000 tons. The company recently organized the Mantua Chemical Co., whose works are at Paulsboror, N. J., on a tract of 250 acres, through which flows Mantua creek, giving access to the Delaware river. The company also owns a plant at Sixth and Jackson streets, Camden, N. J., and a pyrites mine in Virginia.

STEGEMAN MOTOR CAPITAL INCREASED.

The Stegeman Motor Car Co., Milwaukee, Wis., has increased its capital from \$100,000 to \$200,000, and has moved into its new office building. The new factory addition will be completed within a month and an increased production schedule will go into effect.

With the increase in capital the personnel of the management has been increased. Oscar Stegeman is president,

Concerning Retardation of the Automobile

Proper Braking On Vehicle Which Moves Swiftly Through Crowded Streets of Cities Great and Small, an Important Factor in Reducing Automobile Death Rate, Discussed Before S. A. E. Recently

By JOHN YOUNGER

*Chief Engineer, Motor Truck Department, Pierce-Arrow Motor Car Corp.

DURING the past two or three years emphasis has been laid on the accelerative ability of cars. Designers have vied with each other in getting the last fractional inch per second per second into their performance curves. Advertising managers have not been slow in accelerating the peaks a little further and found that the public liked it.

Get Away, Pick Up, Dash, Verve—I myself have called it *Elan*—are all familiar terms for the engineer's word acceleration. There is as yet no such term of endearment for retardation. Its significance has not gripped the people's imagination, and yet of the two it is of more vital importance. The automobile death rate increases in inverse proportion to the efficiency of the retardation curve.

In fast rail traffic, with many stops, the possible retardation curve is first studied. A continual stream of cars passes through the New York subway, with an extremely small headway at rush hours; as a result the motormen know almost to a fraction of a foot just where the brakes must be applied to stop at the required point at a station. In street car work the profit that can be derived from a set of rails in a busy district is as much a question of retardation as of acceleration.

Types of Retardation.

The automobile moving rapidly in and out of city traffic places, perforce, great dependence on its brakes. Good braking contributes greatly to the feeling of liveliness. A car with good acceleration, but sluggish retardation, does not feel as lively as one in which both are good. Retardation can be studied under two heads:

1—Retardation relative to the road.

2—Retardation relative to the forces acting on the car.

The primary object of (1) is to slow down and actually stop the car. The object of (2) is to maintain the vehicle at a steady and safe speed, notwithstanding the forces, such as effect of gravity on a hill, that tend to accelerate the vehicle.

The coefficient of adhesion or friction of the tire varies greatly with its shape, the nature of its tread, whether it be solid or pneumatic and with the compound of rubber used. The fact that the road surface ranges from cement or vitrified brick to greasy mud makes it impossible to give accurate figures for the coefficient.

The coefficient of maximum adhesion for solid rubber tires on good macadam has been given* as 0.4 by George W. Watson. Other authorities state that 0.6 is correct for pneumatic tires. The author has found that the coefficient is 0.6 for solid rubber tires on cement and vitrified brick roads, and only 0.5 under similar conditions for pneumatics. The measurement of tire adhesion is, however, inextricably mixed up with that of road resistance, the number of factors entering in being exceedingly large. A convenient and accurate value to assume is 0.5, and this is concurred in by several authorities.

I have been careful to use the term adhesion as specially applicable to the case where the tire does not slip relatively to the road. When the tire slips the proper term is friction. There being no relative motion between the surface of the tire and the road (the road moving back at the same speed as the tangential velocity of the car), the case is analogous to a body at rest on an inclined plane. The coefficient of "stiction" or adhesion is greater than that of friction. Incidentally, this partly explains why a car stops more rapidly when the wheels are kept moving than when they are locked.

Smooth asphalt, concrete, brick, good macadam, which of-

fer little resistance to the passage of the car, have fortunately a good coefficient of adhesion when dry, thus offering fair compensation. Road resistances vary from five to over 300 pounds per ton and must be considered in the study of retardation.

The wind resistance can be taken as $0.002 A v^2$ in pounds where A is projected frontal area in square feet, usually about 25 square feet. This resistance varies with wind velocity and direction. Strictly speaking, it should always be considered, but its effect is small and can be neglected.

Value of Retarding Force.

Given brakes on all wheels, and neglecting road resistances, the retarding force is $0.5 W$. By substituting in the inertia formula $F = Wa/g$, we find the retardation is $0.5 g$, or 16.1 feet per second per second.

The average automobile is fitted with brakes on the rear wheels only, and its weight is distributed equally on front and

TABLE 1—RETARDATION FACTORS AT VARIOUS SPEEDS.

Car. Speed, M. P. H.	Stopping Time Sec.	Stopping Distance Ft.
60	11	484
30	5½	121
15	2¾	30¾
5	¾	4¾

rear wheels, retarding force is $0.5 W$. By substituting in the inertia formula $0.25 g$ or about eight feet per second. The conditions are shown in Table 1:

The presence of road and wind resistances and of chassis losses will increase the retardation from eight feet to almost 10 feet per second per second, so that a car traveling at 30 miles per hour will stop in 4.4 seconds in about 97 feet.

Everyone has experienced the peculiar feeling of being shot forward in the seat when brakes are suddenly and strongly applied in a railroad train or a street car. The eyes have not prepared the body to brace against the action, whereas in an automobile the eyes are usually on the alert and the body is well prepared for violent retardation.

Yet in railroad service the best stopping time is that recorded in March, 1914, when a Pennsylvania train, moving at 60 miles per hour, was stopped in 1000 feet. This took 22¾ seconds, the retardation being only 3.87 feet per second per second. The train was equipped with an experimental type of Westinghouse brake.

An acceleration or retardation of six feet per second per second is about all that can be borne in comfort by passengers. Extreme change, such as stoppage against a stone wall, will catapult passengers out of their seats with great violence. A retardation of six feet per second per second is on the verge of discomfort; it is, I think, reasonable to believe that 10 feet per second per second is the maximum. This, by the way, is equivalent to an applied horizontal pressure on the passenger of about one-third his weight. So with the chassis. The inertia effects on the body fastenings, engine and transmission fastenings are usually based on the low-speed acceleration, which is rarely more than 10 feet per second per second, the equivalent of a 30 per cent. grade.

Four-Wheel Brakes.

It is thus seen that for the average vehicle little is to be gained in putting brakes on more than the two rear wheels, even though four-wheel brakes might be adjusted to reduce the friction on each brake so that it is only half of what it

might be with the two-wheel brakes. The four-wheel brakes are exceedingly difficult to keep in adjustment, and there is real danger in excessive retardation being produced under the normal circumstances of driving over dry roads. Railroad conditions are not analogous, as a coefficient of adhesion of 0.2 is about all that can be reckoned on, as against one of from 0.5 to 0.6 on rubber tired automobiles.

Two-wheel brakes, provided they function properly and are used intelligently, will give all the retardation that it is safe to use. There are, of course, other reasons why four-wheel brakes have not been adopted generally.

The foregoing remarks have dealt mostly with a car whose weight is distributed equally fore and aft. The passenger load is usually a small percentage of the gross weight, and there is an obvious limit to the capacity of the space that can be used for carrying people. In motor trucks the weight of the load is often equal to that of the vehicle itself. Twice the rated load is occasionally carried, although this evil is, I think, getting less.

In some trucks the load is about equally distributed between front and rear wheels. Usually 75 per cent. and upward of the load is carried on the rear axle. The weight of a truck is not proportional to its load. A two-ton truck with body may weigh 6000 pounds; its weight is one and one-half times that of its load. A five-ton truck with body may weigh 10,000 pounds; its weight is then equal to that of the load.

Each truck must, therefore, be considered individually, and the braking effort on the circumference of the rear

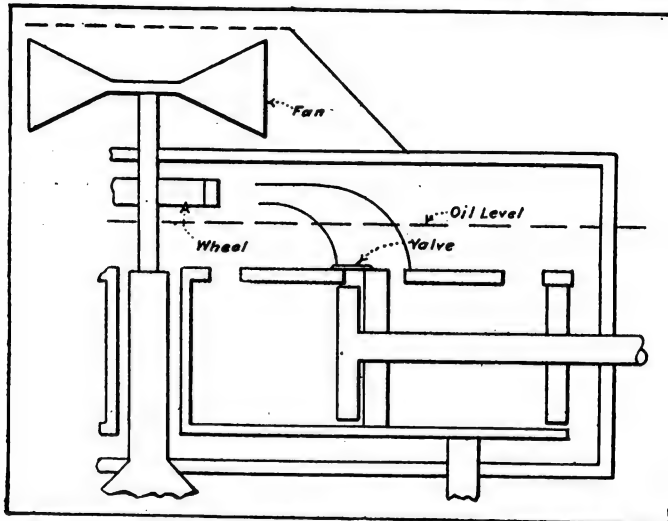


Fig. 1—Illustrating Operating Principle of New Braking System.

wheels be made equal to at least 0.5 times the loaded weight on the rear wheels. If the speed of the truck is 15 miles per hour, it can be stopped in about 30 feet without causing the load to pile up behind the driver's seat. This distance should satisfy any law-making body, and should make it unnecessary to provide safety guards or fenders.

The effect of the human element in producing retardation is great. Brakes must be skillfully applied, so that under varying road conditions the pressure is just enough to not lock the wheels, otherwise a dangerous skid may result. Women are driving cars in increasing numbers. They cannot exert the pressure on a pedal or lever that a man can. Designers must awaken to this problem. If a light pressure is given, brakes must be adjusted more often, unless some mechanical or electrical means be supplied for assisting the driver. Such means must be delicately arranged so as to give perfect gradation of pressure, but the problem should not be impossible of solution.

Absorption of Energy.

The question of absorption of energy has been ignored in the foregoing, inasmuch as the time interval is short, and the material surrounding the brakes capable of taking up the heat developed. On a long hill, when brakes are applied continuously, the problems that arise are different. Here there is no question of inertia effects, or of skidding, or of stopping space; the great question is one of absorption of energy and

hence of radiation of heat.

At the top of a hill a car possesses both kinetic and potential energy. If at the bottom the car's speed is unchanged, then the brakes, plus the road resistance, have absorbed the potential energy. The weight of the car plays an enormous part in this, the absorption of energy being in direct proportion to it. While the truck lacks the speed of the touring car, its greater weight makes the retardation problem more difficult, particularly in hill descents.

Many hills have a 10 per cent. grade and are one-half mile long. A five-ton truck, gross weight 20,000 pounds, has a gravitational component downward of about 2000 pounds. Assuming a road resistance of 50 pounds per ton (of 2000 pounds), or 500 pounds gross, the net force tending to accelerate the truck down hill is 1500 pounds.

If a safe speed of 10 miles per hour is maintained the time of descent is three minutes. The energy absorbed by the brakes is 1500×2640 , or at the rate of 1,320,000 foot pounds per minute. This is equivalent to 40 horsepower, or to 1700 B. t. u. per minute.

Since metal weighing about 50 pounds, with a specific heat of 0.12, absorbs this energy, the heat generated in three minutes (neglecting radiation) is sufficient to raise the temperature of the mass from 60 to 900 degrees Fahrenheit. The temperature required to dissipate the energy absorbed by the brakes was calculated to be about 760 degrees Fahrenheit.

We made an actual test with one square foot of brake radiating surface. The five-ton truck mentioned was driven down the 10 per cent. grade one-half mile long at 10 miles per hour. At the foot of the hill the temperature was certainly nearly 760 degrees Fahrenheit, the radiating surface being at a black heat.

There are hills much worse than this in length and grade; the only salvation then is the use of the engine, alternating with hand and foot brake. The normal brake is satisfactory for the greater part of automobile touring, but for hilly and mountainous districts there is still much to be done in improving brakes. European designers have been well aware of this; some of the Italian designers whose testing grounds are the Swiss Alps have even gone the length of water cooling their brakes, both by drip and by water jacket.

In only one truck, and that of Swiss design, has an attempt been made to solve this problem. A device is used that shifts the camshaft longitudinally, converting the engine into what is really a two-cycle air compressor, the carburetor being shut off and fresh air admitted through a manifold port.

From time to time brakes working on a hydraulic principle have been devised, but always there has been the problem of cooling the liquid and insuring the tightness of pipes and joints.

It is the author's belief that as country roads are opened up more and motor trucks used in outlying districts, a demand will arise for a third brake for hilly districts. The vehicle can then coast down a long incline at a predetermined safe speed, with no wear and tear on the engine or undue heating of the brakes.

DISCUSSION:

A. Ludlow Clayden:—I have felt for a good many years that we were not going to be satisfied with man-applied brakes. Carrying so much potential energy about with us in an automobile, why not make it do all the work? Driving in hilly country becomes tiring in the average car. I think that not more than three British cars will stand Alpine touring work. Of course, England is much flatter than the Alps, although it is much more hilly than the United States. The Italian and some of the French makers are the only ones making brakes adapted for long hills. The great fault of the Italian brakes is noise. Most of them are, of course, made of metal rather than fabric. I use the word "fabric" to cover all kinds of woven brake material. Fabric linings are comparatively little used on the other side of the water. Cast iron is the favorite braking material, but is almost impossible to make perfectly quiet in action. Unless it receives a great deal of attention I do not believe that you could use a metal brake with any great success in a country where the normal road conditions are such that you are likely to keep the wheels smothered with water.

There is another point—that of taking the heat away from the brake. If we use a fabric lining the conditions are more difficult than if we use a metal braking surface, because of the poor conductivity of the fabric linings, which means really that only the brake drum is left to carry away the heat. As a result the efficiency of the shoes must be considerably reduced.

Phosphor bronze has been used, but, according to the general experience it was too unreliable a material. It was not liable to rust, but it was prone to pick up and tear, just as copper will. The Sheffield Simplex Company of England has spent a great deal of time investigating brakes and made a successful expanding shoe brake as follows: The shoe was about two inches wide and was lined with strips about $2\frac{1}{4}$ inches long, alternately of cast iron and some other material. Cast iron was tried with aluminum, with white metal, with phosphor bronze and heavily compressed fabric. The last time I saw the people working on this brake—some two and one-half years ago—they said that the fabric and iron seemed to wear down evenly, the material in the fabric appeared to squeeze out and had a lubricating effect on the cast iron.

Operation of Special Types.

I have tried the electric brake, which has been on the market a long time. This brake takes a little training to handle it, but one can get an extremely delicate control as soon as he is accustomed to it. I hope soon to try the vacuum brake of the Prest-O-Lite Company. As far as one can judge on paper, its effect depends entirely on the delicacy of operation of the compensating valve. With such a device it seems quite possible to provide an adjustment so that the sensitiveness could be made to suit the driver. A powerful spring could be arranged to require about the same pressure as the accelerator pedal. If such a spring were placed somewhere beneath the plunger so that the driver would have to press one of his feet down hard, there should be no trouble. I do not see why an adjustable resistance should not be used. Of course after a time it would not be needed, but in new devices it is often necessary to add features that can afterward be omitted.

Acting Chairman B. B. Bachman:—The development of the industry has been so rapid and so many problems have been staring us in the face that the question of research and of finding out fundamentals has been neglected. We have been doing some experimenting with brakes. In order to facilitate the work the brake was mounted at the rear of the transmission, thus in some ways accentuating certain features of its construction. The speeds are much higher and the temperature conditions more severe.

The point that Mr. Clayden mentioned, as to the conductivity of the so-called fabric linings, is one that was forcefully brought to our attention. Our first construction was a pressed steel drum, about one-quarter inch thick. The brake was about seven inches diameter. The shoe was lined with fabric. We found that in descending a normal hill the temperatures would rise to such an extent that the brake would not hold by the time we reached the foot of the hill; after a short amount of work with that brake the temperatures had increased to such an extent that we had an hour glass effect in the drum. Following that we made a brake drum of steel and with it tried cast iron shoes. On the whole the experiments gave us a better idea of the operating problems, and a graphic idea of the energy that has to be absorbed in controlling a vehicle. In our case we were handling a vehicle with a gross weight of about 10,000 pounds.

Mr. Younger mentioned the laws being passed by legislative bodies. A serious and grave problem is confronting the manufacturers of commercial and pleasure vehicles because of the number of fatalities that have occurred, just in this district alone, during a portion of the current year. The legislation that has been passed does seem to be a serious effort to eliminate the trouble. They have simply tried to use patent medicines to cure a real disease. We want to determine the fundamental features of the disease and then apply cures for them.

W. M. Newkirk:—I have ridden in a car made by a Chicago company in which the generator effect of the starting motor is used for the braking. This seems to give the maximum braking effect up to the point when the wheels begin to slip and momentarily stop.

Leon Goldmerstein:—I have recently done some experimenting on braking devices. As Mr. Younger stated, the brake has two functions: To stop the car on the level road and to hold down its speed on grades. The two functions are entirely different. We cannot possibly design a friction brake to do both things without giving it extreme dimensions. I tried to figure out the same problem that Mr. Younger has in his paper. I found that if a 3500-pound car is going down a 12 per cent. grade, at a reasonable speed of 10 miles per hour with a properly designed and unpainted brake, the radiating surface must be about 800 square inches. The kind of paint on the drum makes a great difference in radiating properties—the characteristics of the paint and whether it is bright or dull. If the brake drum, the rear axle and some of the parts are painted, the radiating surface has to be probably about 900 square inches. If a vehicle is descending a hill, say $1\frac{1}{2}$ miles long, with an incline of 12 per cent., we will find that at the bottom of the drum, the brake band and the fabric will be overheated. The fabric will be overheated to such an extent that the next time it is used and given a hard shove it will fall to pieces and the car will not stop. I talked recently with one of the officials of the New York police department. He stated that in a number of accidents they have investigated the brakes and found to the great surprise of the driver, an experienced chauffeur in many cases, that they were entirely inefficient and incapable of stopping the car.

Solutions of Braking Problems.

There are only three solutions to this problem. One solution is to design the brake so large as to give it sufficient radiating surface. About seven or eight years ago I saw at the Benz factory a brake drum with little copper fins all over it.

The object of the copper fins was of course to increase the radiating surface. Copper has not only a considerably higher conductivity than most metals, but, if properly treated, it will have a considerably greater radiation.

Now, curiously enough, ordinary copper—that is, smelted copper—will have a higher coefficient of radiation than electrolytic copper. Just why is not quite clear to me, although it is probably because electrolytic copper is considerably denser.

The size of the brake cannot be increased indefinitely for the simple reason that if a surface of 800 square inches is required for a 3500-pound car, one of something like 2000 square inches is needed to hold a five-ton truck even on a moderate grade. We may finally reach the point where we cannot increase the radiating surface sufficiently to take care of the heat. There are other ways of handling the problem: One is to absorb the heat by means of some liquid which is cooled by fans. This method was tried in England and in Germany and proved entirely satisfactory. A second way is to absorb the heat by direct cooling. In doing this we encounter the difficulty Mr. Clayden mentioned, namely, the poor conductivity of the brake band.

I have made tests of the conductivity of some of the fabrics, and have found it is possible to increase the conductivity of the fabric by decreasing slightly its density. The conductivity of asbestos is extremely low. Air is a still better heat insulator, but it is queer that the heat conductivity of woven fabric is nearly inversely proportional to its density. In telephone insulation work it has been found that the denser the paper used for such purpose the worse electrical insulator it is; the best insulator is not the paper at all, but the air in the interstices of the paper.

New Braking System.

Another solution of the braking problem is to provide a system of taking up the down-grade acceleration entirely different from the friction brake. The principle of one such system may be described as follows:

Imagine that in some way the piston rod of an oil pump, Fig. 1, is connected to the car wheel directly through the brake drum. Imagine also that the whole thing is immersed in an oil vessel. Then as the wheel revolves it will have to drive

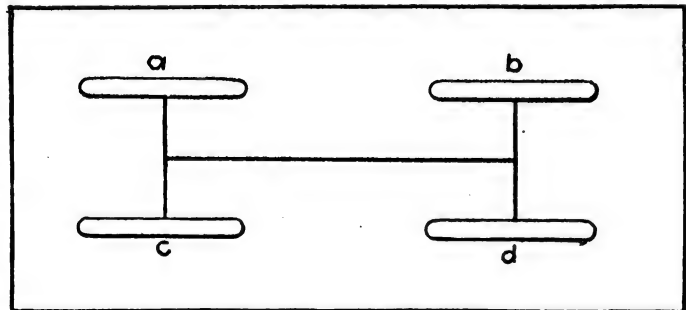


Fig. 2—Vehicle for Diagonal Braking.

the oil from the pump into the oil vessel. Here all the work would be consumed over and over again in pumping the oil. In such a case all that would be necessary is to move the little valve in such a way as to modify the cross section of the orifice.

This design involves a question as to what is the power the brakes must exert. I calculated that in order to stop a car traveling 50 miles per hour within about 350 feet an effort on the brake equivalent to 450 horsepower is required. If the brake were acting as a clutch the clutch would have to be between 30 and 40 times larger than the clutch by means of which the engine drives the car itself. Of course no such effort could be taken care of on such a car. It is possible however—and in fact is practically done now—to design a brake so that the braking is effected in three stages. The first would be the closing of the clutch driving the pump; the second the gradual closing of the discharge orifice of the pump until enough is left to relieve the pump from excessive stresses; and the third the action of the usual friction brake.

The problem in all braking devices of the class described is that of consuming the heat. We do it by pumping the oil, but then what are we going to do with the heat developed in the oil while we are pumping it? The oil will heat to the very amount to which power is consumed by the pump. This has been solved as follows: The pump discharges the oil into a pipe from which it flows on to a little wheel that has blades all around it. This wheel drives a fan on the outside of the casing. The oil is discharged in a stream. With a car weighing 3500 pounds, going down grade at 10 miles per hour, it is discharging a stream at about 2300 feet per minute. This transmits to the little wheel about six horsepower, which is consumed in producing a powerful blast.

E. R. Whitney:—At one time I thought that truck brakes were not powerful enough, so I started to make one that would work easily: we arranged a device that would wind up in either direction, with the car going backward or forward. This brake was put on a two-ton brewery truck. With the usual type of driver the block tires with which this truck was equipped were ripped out by the roots. On wet ground the truck would turn circles. So we had to go back to the old type of brake with which the drivers really had to do some pushing to apply it. That is important on truck work. The driver must be made

to exert himself to apply the brake if any regard is given the tires.

The proper basis on which to design brakes is not how quickly the car can be stopped with everything right and on dry ground, but under the worst conditions—the truck going down hill, and with a wet pavement and smooth tires. Start on that basis and make the brake difficult to apply—so that it requires considerable effort. On dry ground it will be impossible to throw off the passengers. This idea will lead to four-wheel brakes and to uniform weight distribution, whether loaded or light. The four-wheel brakes have many elements of virtue.

We made some experiments at one time with front wheel brakes. The car load was distributed equally between front and rear wheels and the front and rear brakes could be applied independently or together. We have found that front brakes are really safer than rear brakes and can be applied with less tendency to skid. If the front wheels were locked on wet ground the wheels turned for a considerable angle. At the same time, instead of skidding and the rear getting ahead of the front, it will push ahead in the direction the truck is moving, so that if with four-wheel brakes the brakes on the front wheels were stronger than those on the rear, a car could be stopped on wet ground much more quickly than with the rear brakes alone. The disadvantage, of course, is the complication and added cost.

Diagonal Braking.

A. Ludlow Clayden:—On automobiles of any kind you have four wheels arranged about as shown in Fig. 2. The maximum directive power is obtained only when the wheel is rolling freely. As soon as the wheel is locked it is of no further directive value, no matter whether it is a front wheel or rear wheel; that fact led to the making of some experiments with a little wooden model, that could be rolled down a large table top, which was tilted. We found if the model was started down the slope with either the two front or the two rear wheels locked, it would circle about and take up all sorts of positions. But by locking the wheels a and d, and leaving b and c free we obtained the best effect. Some time after this experiment was made the Argyll company produced a car in which the pairs of brakes were so linked. One set was operated by a pedal and the other by the hand lever; it worked out well. The only difficulty was the mechanical complication of making connections to the front wheels. Of course the cost of the front hubs with all their brake gear was considerable; the connecting called for a number of universal joints, levers and rockers. Shortly after that the system was developed of applying friction brakes by a hydraulic device. A small pipe led down to the expanding cam, which was operated by a small piston, and pressure was applied on an oil reservoir. I think a car with that hydraulic brake had the most stopping power of any in which I have ever ridden.

Author's Closure.

John Younger:—The diagonal brake mentioned by Mr. Clayden was tried in the London fire engines on the Dennis trucks, and it did produce a terrific retardation. It would stop the trucks so suddenly that it would almost shoot the firemen to the top floor.

One reason why I have not studied the four-wheel brake seriously is that we are faced with the problem of maneuvering. We have to make trucks so that they can back up to yards, and it is important to be able to turn in a circle. The mechanical difficulties are so numerous with a four-wheel brake that I have never attempted to solve them.

Mr. Whitney raised a point about the drivers of brewery

trucks. These men usually weigh from 250 to 350 pounds. We employed one of these men to do some testing. We asked him to push lightly on the pedal, but he had a good foot, and he broke the pedal. He exerted an effort of about 450 pounds. It is impossible to put a man like that on a truck and ask him to operate the thing gently. We expect a man to push pretty hard in order to get his truck stopped.

I think that the electro-magnetic or gasoline-electric car has not yet reached such a stage of development as has the ordinary gasoline car with straight mechanical drive; it is far too early to think that the magnetic principle of braking should be adopted. It is a beautiful brake, but at present we have to pay for it far too highly, on account of its cost and weight.

The point that was raised about paints is exceedingly interesting, as was the point about the less dense fabric being a better conductor of heat than the dense fabric. That throws a great deal of light on an experience I have been unable to account for, namely, that the hydraulically operated brakes, while standing up better than others for ordinary stoppage work, have not stood up as well for long haul work. I could never account for it. I thought that probably the breaking up of the fibers produced the disintegrated mass. Mr. Goldmerstein's explanation is quite new and is worthy of further investigation.

Braking Materials.

The whole problem of braking materials is a study in itself. I have tried many different materials and have come down to two at present; one is a good grade of cast iron and the other fabric; the fabric for short stoppage and the cast iron for long distance work. The ordinary brake drum is quite a crude affair. If the ordinary brake drum is simply turned on its edge, little spikes will readily be seen on it upon examination under the microscope. Now, if that surface is ground, the life will be a great deal longer. It is also important to see that the hardness is even; otherwise stresses will be introduced. It is advisable to keep sand away from the brake; some people dump sand on it as a kind of lubricant and there is trouble.

Another thing that has been tried is the composite material—cast iron with plugs of bronze or copper. A 50 per cent. mixture of lead and copper is an excellent braking material, but there is trouble when too much lead is used. That construction has been tried also with pieces of compressed brake lining squeezed into it under pressure. A brake made in Philadelphia makes use of a material something like quartz. All kinds of brake materials have been tried out, but most of them have been designed to give longer life to the brake. Little has been done yet in the way of obtaining a greater radiating capacity.

The point has been raised about legal requirements. If I were a police commissioner I should like to enforce one law, and that is this: An inspector should be able to go on any car, provided the road is dry, and say of asphalt or good macadam, cement or brick, and make a brake test going at say 20 miles per hour and within certain limits, and if the car does not stop he should have as much right to take the driver into the police station as for breaking the speed limit. If that were done there would be fewer accidents. I think we should advocate it as leading to a solution of some of the automobile accidents. The headway between automobiles is much less than it used to be and people are so accustomed to them that they have become more careless. I think we ought to help the police authorities in their problem.

*See proceedings Institution of Automobile Engineers, 1915-1916, p. 162.

NEW JERSEY LICENSE LAW.

New York City.

Editor Automobile Journal,
Pawtucket, R. I.

Dear Sir:—Kindly inform me regarding the new license law of New Jersey. There seems to be some misunderstanding of it here. Will an auto of New York registry have to pay an additional license fee for chauffeurs and a New Jersey registry fee additional, if he goes through the State of New Jersey—or any additional fee at all if passing through that state?

P. E. K.

Ans.—Our understanding is that the new New Jersey act does not change the reciprocal relations between New Jersey and New York, which permits cars from each state to tour through each other's territory without paying a license. A statement secured directly from the New Jersey department of state, says:

"The State of New Jersey extends reciprocity privilege to non-residents for a period of 15 days in any one year, and to the questions which you propound in

your communication we answer in the negative, provided the tour of the New Yorker through New Jersey does not exceed 15 days. In brief, no fee whatsoever is exacted by this state for allowing a car registered in another state to pass through the commonwealth of New Jersey."

CHAMPION "RUM HOUND" HAS MOTOR LICENSE.

A witness testifying in a recent hearing before the committee on roads and bridges of the Massachusetts State Legislature, stated that the owner of an operator's license in the Bay State who was given a jail sentence recently, had a record of 14 arrests for drunkenness since 1911 and four times since Sept. 30, 1916; that he was so drunk when arrested that he could not stand without help; that he had run down a motorcyclist, broken one of his legs and smashed the motorcycle; that he had half a pint

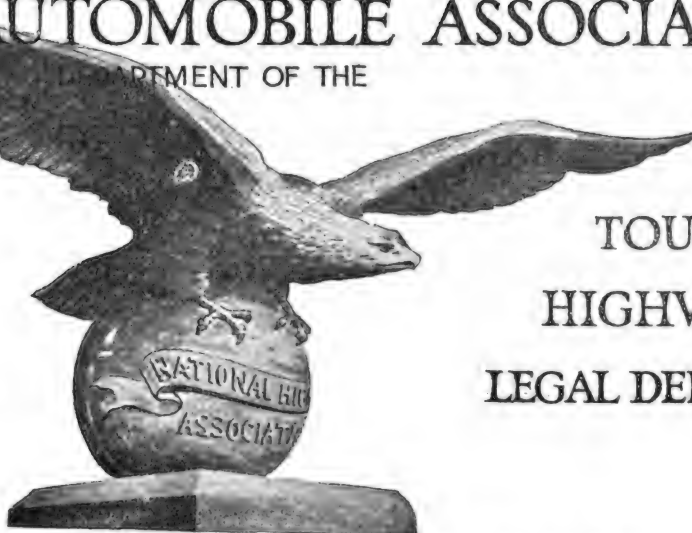
of liquor in his pocket and admitted having drunk two or three times before he got out of Chelsea. He also testified that the same man had been sentenced three times to the House of Correction for drunkenness since 1911, and had paid \$80 in fines, in sums of from \$5 to \$15.

LARGE PLANT FOR CHAMPION IGNITION.

The Champion Ignition Co., Flint, Mich., has placed a contract for another story to be added to one of their buildings, which will give them an increased floor space of 10,000 square feet. The heavy demand for A. C. spark plugs, the company's product, made necessary additional manufacturing space. This is the third addition within the last 18 months and when completed will provide a total floor space of 80,000 square feet as compared with 27,000 square feet, the space occupied for manufacturing less than two years ago.

OFFICIAL JOURNAL OF THE NATIONAL AUTOMOBILE ASSOCIATION

NATIONAL
HIGHWAYS
ASSOCIATION



TOURING
HIGHWAY
LEGAL DEPTS.

9 PARK STREET, BOSTON, MASSACHUSETTS

Used Car Buyer, Beware!—A Legal Maxim

Motorists Cautioned to Have a Complete Understanding, and, if Possible Have It in Writing, in the Light of Commercial Law and the Principles Dictated By Jurisprudence—General Legal Notes

THIS is the season of buying, not only new, but second hand motor vehicles, and as usual there is a consequent competition among dealers of second hand and used cars. Inducements at attractive terms are being presented to buyers, but we desire to caution our members and motorists generally, who have not before bought cars, to have a full and complete understanding, written if possible, with vendors of motor cars.

The best rule, in fact, for purchasers to follow is to obtain a guaranty from the vendor, as when this is not got the legal maxim of caveat emptor—let the buyer beware—applies.

The principle of law involved in such transactions is that when a sale is made of specific articles and the buyer has ample opportunity to examine the property, he has no right to rely upon statements of the seller concerning its value, because such statements are to be regarded as mere "seller's talk."

To maintain an action for deceit in the sale of an article a person must prove that he was induced to buy it by the fraudulent misrepresentation or concealment by the seller of material facts, and that he suffered damage thereby. He has no cause of action if, having ample opportunity to examine the property, he saw fit to rely upon the statements of the seller, concerning the value of the thing sold. It is everywhere understood that such statements and commendation are

to be received with great allowance and distrust.

INSURANCE:

"WAS COVERED" (?)

It is not uncommon for motorists to order their motor vehicles "covered" by fire and theft and liability insurance and to do nothing further about it until "something happens." A decision of the Supreme Court of Massachusetts, which has just been handed down and is published here at some length, ought to have the effect of showing purchasers of insurance that they must not be indifferent to actually securing their policies or of taking too many things for granted.

The plaintiff, in this case, who had for some time been doing insurance business with one who was assistant, co-manager, or agent of the company, called to place some \$2000 worth of insurance on her property and not finding the agent in she stated to a clerk what she desired. The clerk told her that he would give the facts to the agent and added that she need not worry that she was "covered." She then paid a small sum on the account and said that she would be in later to settle up. This was in July, 1913. She received no communication from the agent and no policy from the company, and did nothing about the matter until after her property was destroyed by fire in December of the same year.

It has been decided in numerous cases that verbal contracts of insurance are

valid; but it has also been decided that each case is determined from all the circumstances surrounding it. This case turned upon the significance of the words "was covered," and the court said:

"You are covered" is a phrase in common usage in reference to insurance. Its meaning ordinarily as applied to fire insurance is that the property shall be insured in the standard form of insurance from that instant for a reasonable time until either the policy or policies can be written out or their issuance approved or disapproved by authorized representatives of the insurer, or some other temporary impediment to the complete and formal contract of insurance may be removed. It constitutes insurance for a reasonable time considering all the attendant conditions. It refers to a temporary and not a permanent condition of insurance. It does not mean, commonly, that the property shall continue to be insured for a substantial term after the expiration of a reasonable time for the execution of a formal contract or the determination of other preliminary matters. The signification of the phrase "you are covered" would not be enlarged ordinarily or under the facts here disclosed, even though the authority of the agent were far broader than that of the clerk. It is at least the purport of our insurance laws that all contracts for fire insurance shall be according to the standard form there established. Oral contracts by implication must have read into

them this form. A simple contract by an insurance agent that property shall be covered by insurance does not signify in the ordinary case that it shall continue to be insured after the lapse of months without a formal policy of insurance. It cannot in reason stretch to the perpetuation of actual insurance up to the time of the fire under the circumstances here disclosed. Five-sixths of the term had expired. Only \$3 out of the \$16 were paid. There was no written acknowledgement or oral confirmation of the continuance of the cover.

The plaintiff lived all the time within a few miles of the defendant's office. There are no extraordinary facts. She promised to return to settle, which must naturally have been understood to mean within a reasonable time, having regard to the nature of the transaction in hand. Manifestly it was the contemplation of both parties that a policy of insurance some time should be made out, apparently it was the plaintiff's intent that it should be made out by the agent as soon as he could attend to it after his return to the office. Ordinarily an insurance agent has authority only "to make valid oral contracts of insurance, for some temporary purpose incidental to the issuing of policies for long periods of time."

It cannot be presumed in the absence of special authority that any ordinary insurance agent can bind insurance companies by oral contracts of insurance for other than temporary purposes, or on occasion akin to emergencies, otherwise insurance companies might be involved in liabilities of which they might have no record, or insufficient record, for inspection by the commissioner and their financial soundness be difficult if not impossible of ascertainment.

If the plaintiff was depending upon herself it was her duty in order to be insured for the entire period to do something within a reasonable time to make certain that the cover had ripened into a formal contract of insurance. If she chose to rely upon the agent of the defendant she must prove that that was done by him.

IMPUTATION OF NEGLIGENCE IN A LIMOUSINE.

On the question of the imputation of negligence of the chauffeur to occupants of an automobile, and particularly with reference to the wife of the owner of the car, the Supreme Court of Massachusetts makes some interesting comments.

The cases referred to were four actions of tort for personal injuries, resulting from a collision between a limousine and a street car. Two persons were guests of the wife of the owner of the car and another was her daughter. They were all sitting in the tonneau and a glass partition separated them from the chauffeur.

On the question of the due care of the occupants, the court said that there was no voluntary surrender on the part of the daughter and the two guests to care for themselves and an absolute reliance on the caution of the chauffeur in such sense as to charge them with responsibility

SOME DON'T'S IN BALTIMORE

DON'T park cars within 10 feet of any fire plug.

DON'T block traffic by parking cars in a double line.

DON'T pass street cars in Baltimore City or Baltimore County either on the left or right when the same have stopped for the purpose of taking on or letting off passengers.

DON'T drive inside of any safety gate.

DON'T let engine run while car is unattended.

DON'T pass vehicles from the rear on the right, except those using car tracks.

DON'T drive with cut-outs open.

DON'T exceed the speed limit.

DON'T drive at night with dazzling headlights.

DON'T cover any numerals on front or rear registration tags with anything that will prevent their being clearly read.

Observe these Don'ts and avoid arrest.

bility for his conduct. There is little that a guest, riding in the inside of a limousine, driven on a crowded city street by a chauffeur of presumed skill and experience, can do for his own safety, even in the exercise of a high degree of care. The circumstances are quite different from those of a guest riding in a small horse drawn vehicle, where there is considerable range for the exercise of one's own faculties and where a complete abandonment of effort toward due care and blind dependence on the driver might be fraught with disastrous consequences.

UNREGISTERED AUTOMOBILES.

While a case which has just been decided by the Supreme Judicial Court of Massachusetts follows a well established precedent in that state, that an unregistered automobile is an outlaw and that the driver no more than a trespasser upon the public ways, the comment of the court upon certain phases of the law warrants reflection.

The writer was of counsel in this case, which was an action of tort for damages to the plaintiff's intestate by being struck and killed by an automobile operated by the defendant. The happening was the merest kind of an accident, due, without doubt, as much to the carelessness of the plaintiff as to the carelessness of the defendant. The trial court, however, made a finding for the plaintiff in the sum of \$2250 and the plaintiff being dissatisfied with this sum appealed to the Supreme Court. This court holds that the statute of Massachusetts, which gives the plaintiff her right of action, expressly provides that the amount recoverable must be assessed with reference to the degree of culpability of the defendant and within a fixed

maximum and minimum. The blameworthiness of each wrong doer must be charged by his conduct in the light of attendant circumstances. The statute recognizes that there must be varying degrees of culpability in the different cases that may arise, and within the fixed limits it provides for an appropriate amount of damages, and inasmuch as this finding was contrary to the ruling of the trial court, which was, that assuming that the automobile operated by the defendant at the time of the accident was improperly and illegally registered, that fact was immaterial in the determination of the issue raised by the pleading, ruling by the trial court the exceptions must be sustained. Consequently a new trial will doubtless result.

The facts were these; an application for the registration of the automobile which caused the injury was dated Nov. 9, 1914, and was signed by the owner of the car. A certificate of registration, dated Jan. 1, 1915, and expiring Dec. 31 of that year, was issued to the owner. The owner died Dec. 27, 1914, before the registration took effect. The defendant, who is the widow and one of the executors of the estate, placed the registration numbers upon the automobile in March, 1915, when it was taken out. The accident occurred on Labor Day, Sept. 6, 1915.

The motor vehicle laws of Massachusetts require that a car shall be registered in the name of its owner, presumably for the purpose of affording to travelers on the highways means of redress, by enabling them easily to ascertain the name and address of the owner of the automobile that causes injury to them; and as the highway commission intended to issue the certificate to the owner, and to no one else, the court said; that as the commission was not informed that the owner had died before the certificate went into effect, it never attached, and plainly it could not protect the defendant in September, 1915.

The gist of the decision is that the decree of culpability of the defendant well might be greater if she was unlawfully driving, an outlaw upon the highway, than it would be if she had scrupulously observed all the requirements of law.

One of the contentions of the plaintiff was that as the defendant was driving an illegally registered machine she was therefore an outlaw upon the public highway and her act in running down and killing the plaintiff, constituted a maximum degree of culpability; but the court decided that this construction was not warranted.

WHEN BORROWER IS LIABLE.

A servant in the general employment of one person who is temporarily loaned to do the latter's work becomes for the time being the servant of the borrower, who is liable for his negligence.

NEW YORK AUTOMOBILES.

A report of the motor vehicle registration in New York state shows that out of 317,866 cars, 102,530 were registered from New York City and the city paid \$957,422.25 of \$2,658,041.75 fees.



Wanted—Badly—100,000 Miles of Military Road

**Wartime Needs Support the National Highways Association
in the Movement for a Great Federal System of Good Roads**

THAT road improvement will be of greater benefit to the people of this country, both of the rural districts and of the cities, than almost any other national development has long been the contention of the National Highways Association and is rapidly becoming a commonly accepted fact. The causes are manifold, but probably the ones most readily recognized would be the decrease in the cost of hauling farm and industrial products over the roads, which would mean a reduction in the cost of living—the greatest economic problem of the day—and the ability to quickly concentrate upon our borders troops, munitions and supplies in case of war. In the latter particular alone many valuable lessons may be drawn from the advantage of good highways in the present European conflict, as well as from the lack of highways in our own recent Mexican campaign. The splendid roads of France—and there are almost 400,000 miles of them—made it possible for the French to save Paris, and doubtless France; and it would require no great stretch of the imagination to readily see the great need and advantage of a large and comprehensive system of highways which would cobweb the entire United States, should this country ever be invaded or attacked by a foreign foe.

System Carefully Planned.

It was to attain the consummation of this object that the National Highways Association, at an enormous expenditure of time, energy and money, prepared tentative locations for a system of 100,000 miles of National Highways, the plan of which was published in a recent issue of this journal; and if this great system were built we might well believe that we were prepared for both development and defense. But if we assume that we

should not yet deem it expedient to attempt the construction of a 100,000 mile system, let us see what it would mean to have a 50,000 mile system, or two per cent. of our total road mileage. France, before the war, it may be noted, had a National Highway System which comprised six per cent. of its total mileage, or relatively three times as great as that proposed here. It may be noted also that it is because of this system that France holds a pre-eminent place among all the nations of the earth in the excellence of her roads.

Estimate of Cost.

It is not always possible to accurately set down in figures what such a system would cost the nation, but basing an estimate upon the character and cost of Massachusetts, New York and New Jersey highways, it would be in the neighborhood of \$750,000,000, or about twice as much as the cost of the Panama Canal. To the above sum must be added the cost of maintenance, including depreciation, which would amount to \$15,000,000 or \$20,000,000 a year. That the Panama Canal is of enormous value no American will deny; and no one would deny the enormous value or begrudge the expenditure necessary for 50,000 or 100,000 miles of National Highways—after they were built. But before they are built let us roughly estimate what they would mean to the American people.

These 50,000 miles, which can be completed in 10 years, would traverse every state in the Union; run through 393 congressional districts, or 95 per cent. of the total; serve direct or adjoining 2471 counties, or 84 per cent. of the total; connect every capital of every state with the National Capital, and reach and connect every large and important city;

serve 60,000,000 people; serve in adjoining counties 24,000,000 people—a total of 84,000,000 people, or 92 per cent. of the total population; carry 50 per cent. of our total road tonnage, estimated at 5,000,000 tons, at a saving of more than \$300,000,000 per annum in carrying charges; increase land values adjacent to such highways over \$600,000,000; save annually in the wear and tear of vehicles a sum not less than \$500,000,000; add to the annual increase of our national wealth not less than \$300,000,000; increase travel throughout the country, inducing people to "See America First," thus keeping home annually more than \$250,000,000; provide steady employment for all the idle and unemployed; provide remunerative employment for delinquents and materially improve their condition, besides aiding them towards re-establishment in the community as desirable citizens; increase the prosperity of the farmer more than any other improvement; reduce the cost of living; provide better social conditions in the rural communities and thus elevate their intelligence and their moral well being; make rural life more attractive, facilitate intercommunication, and thus reduce migration to cities and encourage the movement "back to the farms;" enable the building of rural schools and thus reduce illiteracy; and raise the standard and accentuate road building and improvement by states, counties and towns.

To Develop Country.

In other words, this 50,000 mile system would favor, foster and further the development of our whole country, by securing social, moral, commercial, industrial, material, educational and personal benefits which would uplift and enormously advance the whole American people.

More Information for Motorists

General Condition of Main Roads in Vermont is Improved and Very Few Detours Are Necessary

WE HAVE been advised by the State Highway Commissioner of Vermont that the question of detours for the coming motor-ing season will not be one of much importance in that state, because of the manner in which road work is done by the State of Vermont. The town is a unit and road work is done in each town every year. This means that the road under improvement in each job is short and that the local provisions for turning out are easily made. As work throughout the state is not done at any one time, it will probably occur that on any one trip motorists will be but little dis-commoded by turn outs. This plan has been followed for some years, the worst places in the entire state having been eliminated, rather than long stretches of road being built, and the remainder left as before. The general condition of the main roads of Vermont have been im-proved throughout, making the entire system of state highways a feasible and practical one.

DON'T SPEED IN BALTIMORE.

A number of cases of speeding have been reported lately and numerous ar-rests have been made.

For your information and guidance we give you below the speed limit through-out the city and state:

12 miles per hour in thickly settled or business parts of cities, towns and vil-lages.

18 miles per hour in outlying or thinly settled parts of cities, towns and villages.

25 miles per hour in open country.

35 miles per hour in open country, maximum speed, the burden of proof be-ing upon the operator to prove that such speed was not greater than is reasonable and proper.

MEET SPEEDERS HALF WAY IN NEW YORK.

Members of this association and motor-ists generally who operate their cars in the city of New York should bear in mind that the police authorities of that city have inaugurated an experiment to as-certain whether citizens are willing to co-operate with the authorities in enforc-ing traffic and motor vehicle laws.

It is planned that when a policeman observes a speeder he shall not arrest the offender at once unless the offense is a flagrant one, but shall send his name and license number to police headquar-ters. The offender's record will then be investigated and if it is found that he has committed a similar offense previously he is to be summoned before a magis-trate.

If automobilists do not appreciate this treatment the police department will, after a thorough test, abandon the sys-

tem of giving speeders a chance.

A person against whom an indictment is proved, charging a violation of the high-way law providing that any person oper-ating a motor vehicle, who knowing that an injury has been caused to a person or property due to his culpability, or to accident, leaves without giving his name, residence and operator's license number to the injured party, or to a police officer, or reporting the accident to the nearest police station or judicial officer, shall, according to the courts of New York, be guilty of a felony, and it need not be al-leged in the indictment that the accident occurred on a public highway.

NO JUSTIFICATION FOR CARELESSNESS.

On the day of the accident involved in this case it appears that the plaintiff was driving a team of horses attached to a wagon along one of the highways of In-diana, and while so doing the driver of a motor car approached him from the rear at about 25 miles an hour, and fear-ing that his horses might become fright-ened at the approaching car, the team driver signaled to the motor car driver when he was about 100 yards to the rear, to stop his car or slacken his speed, at the same time alighting to the ground, and while subsequently walking along-side of his wagon and horses to better control them the motor car driver, ran his auto against him and injured him.

The court said that there was no justifi-cation for the careless and negligent manner in which the auto was operated, and that this driver, like all others who insist on speeding on the public highways with no regard for the safety of other travelers, must be held responsible in damages for injuries negligently done. Moreover, that the driver of a team in doing what this plaintiff did is not guilty of contributory negligences.

PEDESTRIANS HIT BY AUTOMOBILES.

A pedestrian was crossing diagonally a Boston street when a motorist proceed-ing at a speed of 25 to 30 miles an hour and approaching from the rear gave no warning of his approach except by blow-ing his horn when he was about five feet from the pedestrian. A collision between the auto and the pedestrian occurred and this is what the Supreme Court of Mas-sachusetts said about the matter.

The statutes of Massachusetts express-ly provide that upon approaching a pe-destrian who is upon the traveled part of any way and not upon a sidewalk, every person operating a motor vehicle shall slow down and give a timely signal with his bell, horn or other device for signaling, and that a person acting as this motorist did may be found to be

guilty not only of a violation of law, but also otherwise negligent.

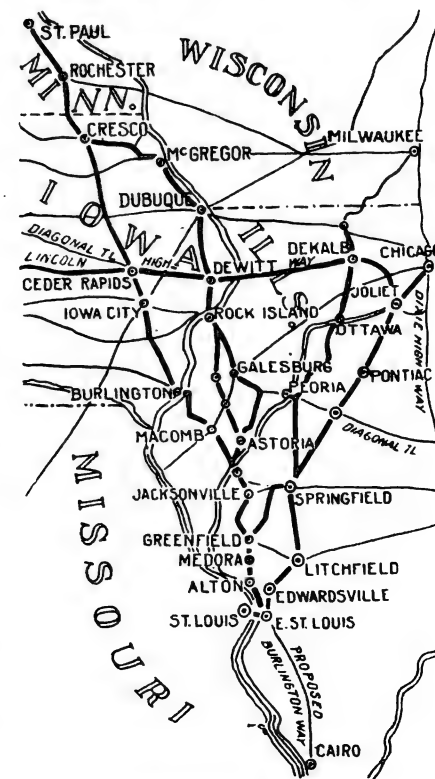
SKIDDING OF AUTOMO-BILES ON TARRED ROADS.

Some motorists were riding in an au-tomobile from York to Kittery, Maine, and as the car reached the top of the hill it came upon a stretch of highway completely covered with a thick coating of oil or tarvia; the automobile began to skid and although the operator did what he could to prevent it, the car struck a stump at the side of the road, overturned and injured the occupants.

In an action brought against the re-sponsible parties the court held that the jury was justified in finding that the de-fendants were negligent in leaving open the way for travel, in failing to warn travelers on the highway of the condi-tion of the road, and also in not placing its warning signs in a proper or conspic-uous position. Moreover, the jury could find that the duty of warning the travel-ing public of this condition of the way rested upon and was assumed by the de-fendant.

"BURLINGTON WAY" MARKER DEDICATION.

The officials and promoters of the "Burlington Way," which is the highway connecting St. Louis with Chicago, and which was described in the last issue of the N. A. A. Journal, will early next month erect a substantial and brilliantly colored marker at the head of the road where the Alton Way branches off. It is planned to have a golden eagle of the National Highway Association at the crest and under it will be the inscription, "Burlington Way Division of the Na-tional Highway Association."



The Burlington Way.

**CLEANING DEVICE.**

(Figure 345.)

Garages and repair shops often make use of kerosene for cleaning. The old pail and cloth method is getting obsolete, besides being dangerous as a fire hazard. Into one end of a 45-degree side outlet elbow, screw a short length of $\frac{1}{8}$ inch brass piping which has been beveled, plugged and drilled with a $\frac{1}{16}$ inch hole as shown at A. This pipe should be attached to or dipped into a kerosene can. A similar sized pipe is screwed into another outlet as shown at B, this pipe, however, is left full size. The other outlet may be left plain, or fitted with a short nipple as shown. When air is forced through B either by a pump or compressed air supply, kerosene is drawn through A, and a fine atomized spray is forced out through the open outlet. The air pressure, as well as the kerosene spray, assists in cleaning the grease and dirt from the engine, body or chassis.

PEDAL DEVICE.

(Figure 346C.)

A good driver always keep his foot on the brake pedal. It is possible that in the excitement of an emergency the foot will slip over the side of the pedal, resulting in an accident. Bend a strip of brass or iron, one inch wide, $\frac{1}{8}$ inch thick, five inches long, as shown in the cut at B, and attach it to the pedal as at C. This will hold the foot firmly in place at all times.

KNOCK DETECTORS.

(Figure 344.)

One who has had very much experience with engines will realize that a knock is very often a difficult thing to locate. Quite frequently a knock in the transmission can seemingly be located in the front of the engine. This is due to the fact that sound is more readily transmitted through metal than air. Illustrated herewith are two knock detectors, or knock tracers. A shows an easily constructed detector, which may be made from a length of dowel pin wood, a tin can and a wood screw. The piece of wood is screwed to the bottom of the can, the cover through which has been punched a hole about one inch in diameter is put upon the can. When the wood is placed against the metal part of the engine and the ear against the

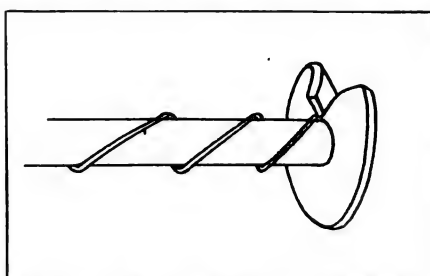


Fig. 343—Eliminating Oil Nuisance.

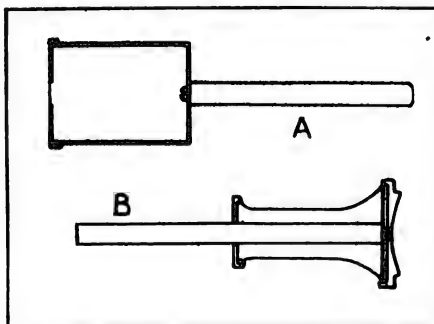


Fig. 344—Two Knock Detectors.

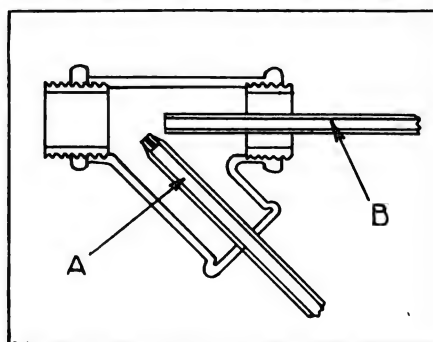


Fig. 345—Kerosene Cleaning Device.

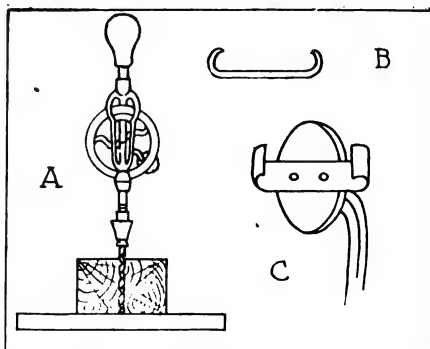


Fig. 346—A, Method Used in Boring Small Holes, B and C, Pedal Device.

cover of the can, a knock or click may be located very easily by comparative tests. Figure B shows a little less crude apparatus made from a discarded telephone receiver and a similar piece of wood. The action is the same. This form of apparatus makes it possible to eliminate outside noises, which cause confusion and make the location of the knock difficult.

BORING SMALL HOLES.

(Figure 346A.)

Unless great care is exercised in boring small holes in metal, the pressure applied will break the drill. It will be found that a hole may be drilled without this difficulty if a block of wood is used as shown in our illustration. The block keeps the drill in line and the drill cannot be buckled up or bent or even broken under excessive pressure.

OIL NUISANCE.

(Figure 343.)

Oil or grease exuding from the rear axle of a car soon causes dirt and dust to collect, causing unsightly appearance to the car. As most of this grease and oil comes from the differential housing, that part may run dry and cause damage. A simple method which often proves effectual is illustrated. A circular piece of tin is cut just large enough to slip over the axle and inside the housing. From the circumference to the centre a slit is cut and the disc is bent so that as the axle turns the general tendency is to push the grease which is collected toward the centre or differential part of the axle. Starting at the disc a heavy piece of wire or clothes line is wound around the axle and fastened near the centre. The screw motion of the device causes the grease to flow toward the centre rather than the outer end of the shaft.

SMALL TUBE PUNCTURES.

"Many repair men in repairing a 'pin-hole' puncture use a patch several times larger than necessary," says Mr. D. R. Cain of the Goodyear School of Tire Repairing. "This requires very heavy pressure to obtain a smooth surface. There is a much better way. Trim the hole just enough to remove all ragged edges, but enlarge it as little as possible. Clean thoroughly and cement. When the cement has dried force a small thread of

gum through the hole with an awl, trimming flush on the outside. In curing use just enough pressure to hold the tube firmly on the tube plate. A piece of holland or tracing cloth laid on the plate will ensure a smooth surface."

MOVABLE HEADLIGHT.

(Figure 348.)

One of the great drawbacks to pleasant night driving is the fact that in turning a corner it is done "in the dark." The ordinary stationary headlights, while they illuminate the road ahead, shed no light on the streets at right angles to the car as the car is turned. An L shaped iron bar, a collar, a light, a piece of strap iron, a pipe cross and two lengths of gas pipe, are the component parts of a movable headlight which is bound to pay for itself in the increase of safety which is added. The illustration clearly shows the application. As the wheels are turned the tie rod is moved to one side, this acts upon the L rod upon which the light is mounted, turning it in the direction of front wheel travel. The light is supported through a pipe cross, held between two short pieces of gas piping, which are in turn fastened to the fenders.

PEDAL EXTENSIONS.

(Figure 350.)

It frequently happens that brake and clutch pedals are too far away from the seat to be easily accessible to the driver. If they are not adjustable, inconvenience is caused. If the pedal arm is flat it is an easy matter to lengthen out and make the pedal adjustable by cutting it across as shown at A, slotting it downward and fitting a piece of flat iron to it as shown at B. It is essential that this fitting be rigid. If bolts are used, be sure to use lock washers. If the floor clearance is great enough two bolts in each member should be used.

HANDY TESTER.

(Figure 351.)

We illustrate an all around handy testing arrangement with the wiring diagram. The device may be made from an old telephone ringing magneto and bell, easily obtainable now as they have been discarded for more modern apparatus. The spring terminals at B may be used for testing fuses, the point and terminal at A for testing light bulbs, the terminals at C should be equipped with wires and spring clips, and may be used for

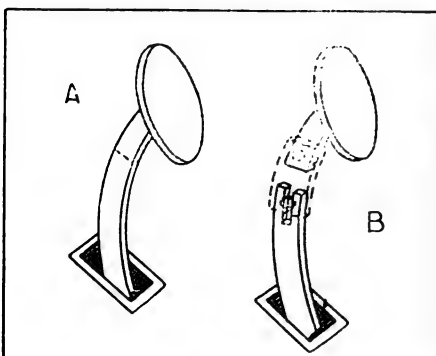


Fig. 350—Pedal Extension Suggestion.

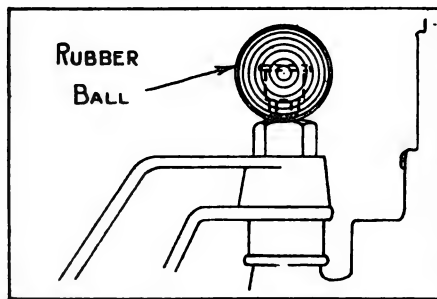


Fig. 347—Protecting Chassis Oil Cups.

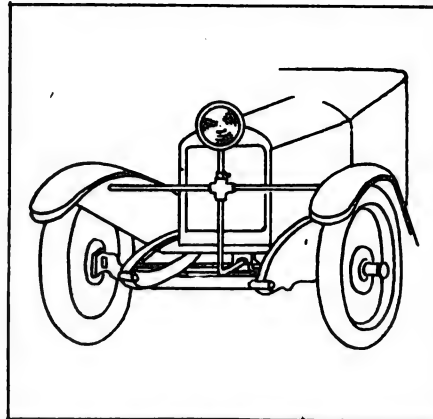


Fig. 348—Movable Headlight.

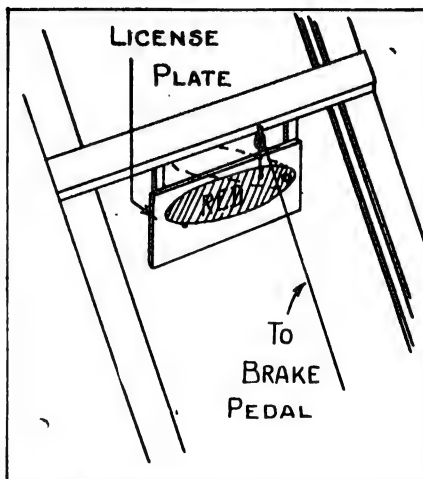


Fig. 349—Danger Signal.

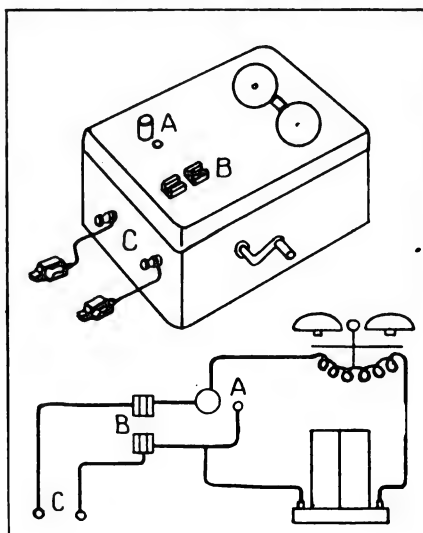


Fig. 351—Handy Tester.

tracing out wiring, testing for grounds, etc. This form of bell is very sensitive, and even the slightest leak in the current line will cause the bell to ring when the handle is turned.

DANGER SIGNAL.

(Figure 349.)

If the motto "Safety First" were adopted and practised as well as used for a by word, many accidents would be averted. The same thing is true of the little device which is illustrated. You owe it to yourself as well as to others to put some such a device upon your car; and if you are limited by lack of money and cannot afford a more expensive device, this one will answer. Bore a small hole through the number plate on your machine and hang a red painted signal arm on a bolt or rivet through it. Near this centre, on the red arm, bore another small hole and attach a piece of picture wire, carry it up to the car frame, through a small block, to the brake pedal. The action of the device is entirely automatic. When the brake pedal is pressed the red arm is drawn upward into view as a warning to the car in back that you are slowing down, and intend to turn or stop. Do it now and avoid accident.

CHASSIS OIL CUPS.

(Figure 347.)

Accumulations of dirt and dust on oil and grease cups are the bane of the autolists existence. Even if the cups are dust tight a slight amount of grit may be carried into them every time they are filled, resulting in a worn bearing. A simple preventive for this may be made from a rubber ball. Cut out a hole in the ball slightly smaller than the grease cup and slip it over the top. The ball may be painted to match the car.

BROKEN NUTS.

(Figure 352.)

It frequently happens that a nut is broken by hard usage and it is inadvisable or impossible to replace it. A temporary repair may be made as shown in the illustration. The corners of the nut are filed off on one end and a washer driven over it. The nut is held together by the washer.

Vibrator points may be filed absolutely flat, sometimes by simply boring a hole in a thin piece of iron, placing it over the point and smoothing off with a file. Such a method will be found very practical in cleaning the points, using a piece of fine emery cloth instead of the file.

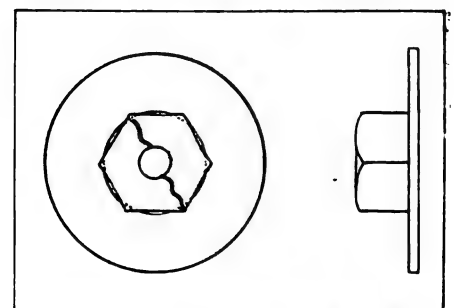


Fig. 352—Repairing Broken Nuts.

**AVIATION SPARK PLUG.**

The Champion Ignition Co., makers of AC spark plugs, now have ready for the market what they term an aviation plug, but which is suitable for use in both aviation and racing motors. This plug is being used for regular equipment by some of the aviation motor manufacturers. They have been thoroughly tested and are now a regular product of the company.

Manufactured by Champion Ignition Co., Flint, Mich. Price upon application.

THE WILMO MANIFOLD.

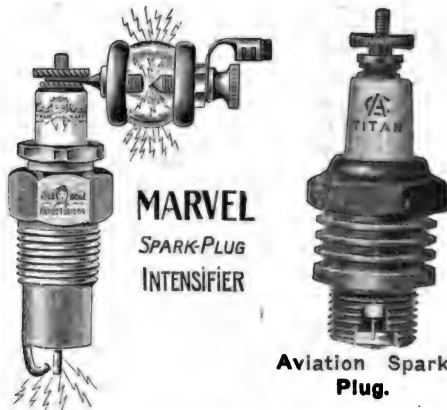
The Wilmo manifold is a one-piece casting, forming a combination exhaust and intake manifold, with a thin dividing wall between. The heat from the exhaust brings the walls of the intake up to a proper temperature to fully vaporize the gasoline before entering the cylinders. The cooling effect created by the velocity of the incoming gas prevents preignition. Wilmo manifolds are adaptable to all types of four-cycle engines where valve ports are on the same side of the block.

Manufactured by Gillette Motors Co., Mishawaka, Ind. Prices range from \$5 to \$10, according to make of car.

BURRILL TIRE TOOL.

The illustration shows a handy accessory for the car operator using a machine equipped with split rims. This tool is designed to be hooked over the rim. When so applied and the turnbuckle turned, the rim is opened, making the replacement of a tire an easy matter. This tool may also be used in expanding the rim after the tire is applied by reversing the process, the untwisting of the turnbuckle exerting sufficient pressure upon the rim to expand it.

Manufactured by the Burrill Tire Tool Co., Inc., 35 Commonwealth Ave., Concord Junction, Mass. Price upon application.

**MARVEL SPARK INTENSIFIER.**

Our illustration shows a device by which, the makers say, the spark between the electrodes of the spark plug may be intensified. They further claim that a plug short circuited from accumulated soot, carbon or grease, or broken insulation, may be made to fire as perfectly as if it were new by the use of this device.

Manufactured by the Marvel Mfg. Co., 1020 Washington Blvd., Oak Park, Ill. Price, 75 cents each, or \$3 per set of four.

FORD HEADLIGHT CONTROL.

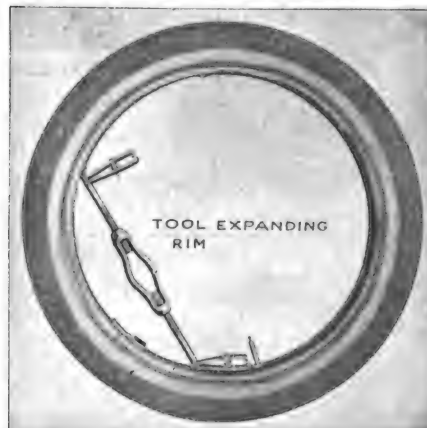
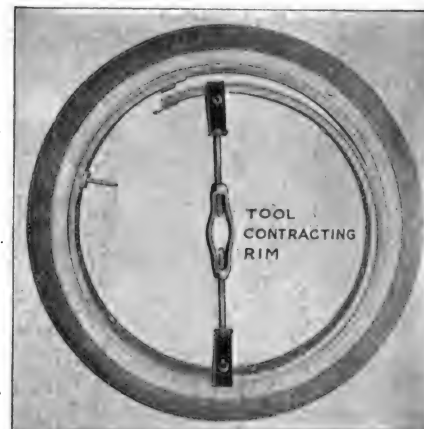
A simple system with which the operator is able to control the electrical current from the Ford magneto for the lighting system of the car is being sold under the name Van Sicklen combination headlight dimmer and intensifier. The system comprises two units, a resistance coil, which is placed in the lighting circuit, and a switch, which is attached to the centre of the steering wheel. The illustration shows the latter. The switch bar may be placed in either of three positions. At "On," the headlights will illuminate at normal, as provided by the regular Ford equipment; at "Dim," the illumination is mellowed as for city driving; at "Con," the current is concentrated into the left headlight, resulting in an intense driving light for bad roads. The system is designed to perform the above functions irrespective of engine speeds.

Manufactured by the Van Sicklen Co., Elgin, Ill. Price, \$4. Complete with wiring diagram and instructions.

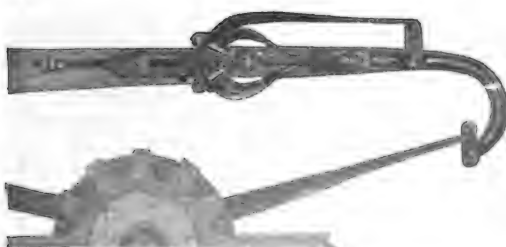
FERNALD SPRING SUSPENSION.

The Fernald shock absorbing spring suspension is intended to be attached to both rear springs of the automobile. It is adjustable from a minimum to a maximum load. The illustration shows this device as applied to a cantilever spring and the action is evident.

Manufactured by Fernald Shock Absorbing Spring Suspension Co., 170 Summer St., Boston, Mass.



Burrill Tire Tool.



Fernald Spring Suspension.



Ford Headlight Control.



The Wilmo Manifold.



Camping Outfit.

STANWOOD STEP PLATE.

For automobile running boards, step plates are useful in preventing the tracking of mud, dirt and water into the car, and also insure a secure foothold when stepping on or off the running board. The Stanwood safety step plates consist of a series of high-grade, semi-pliable rubber segments inserted into an embossed anti-rust metal plate. The rubber segments project $\frac{1}{4}$ inch above the perforated containing plate, and may be readily replaced, should they become damaged through accident. The plate is secured to the running board by nickel plated oval head brass screws.

Marketed by Boston Starter and Specialty Co., 182 Columbus Ave., Boston, Mass. Prices from \$1.50 to \$3.50 according to size.

CAMPING OUTFIT.

Now that spring is here, many automobilists are beginning to think of touring and camping outfits. We illustrate a Handy-Camp combination, which may be carried upon the running board of an automobile. It consists of a "cozy" spring bed and luggage carrier combined. In it may be packed away all kinds of tents, bedding, quilts, cooking utensils and suit cases; practically a whole camp outfit. When unfolded it forms a base and spring for a bed, to be used in conjunction with the automobile tonneau as a dressing room. The bed is all-steel, with link fabric springs, supported by coil springs to prevent sagging.

Manufactured by Tourist Auto Equipment Co., Dahlgren, Ill. Prices upon application.

THE NU WAY BUTTON.

The Nu Way Button is designed to fill a long felt want for an electrical button in the right place. It is attached to the centre of the Ford car steering column, as shown in the illustration, and is convenient and accessible. To attach it, it is only necessary to remove the steering wheel nut, put the Nu Way Button in place and replace.

Manufactured by the Aerofram Co., Inc., 107 Massachusetts Ave., Boston, Mass. Price, 50 cents.



Stanwood Step Plate.



Two-Lite Bulb Case.



The Nu Way Button Applied.



Shaw Wrenches.

Myle-Mayker.

MYLE-MAYKER.

It is being generally conceded that the solution of the low grade fuel proposition will be found in a heated carburetor or air intake device. Such an article is being marketed under the name Myle-Mayker. The device is practically a gravity operated auxiliary air control for the Ford carburetor. It is designed to replace the standard hot air pipe and requires but a minute's time for application.

Manufactured by Myle-Mayker Co., Dept. 3, 56 E. Randolph St., Chicago, Ill. Price, \$5. Special dealers' proposition.

THE SHAW WRENCH.

In the illustration is shown a handy, one-piece wrench, which is designed to accomplish any task that can be done with a Stillson, monkey, alligator or flat wrench. It will be noted that there is a slit, extending from back of the jaws down the handle. This peculiar construction permits light work to be handled with a light grip and heavy work with a powerful grip. The greater the pull required to loosen a fitting the more powerfully the jaw sets.

Manufactured by Shaw Propeller Co., Boston, Mass. Prices furnished upon request.

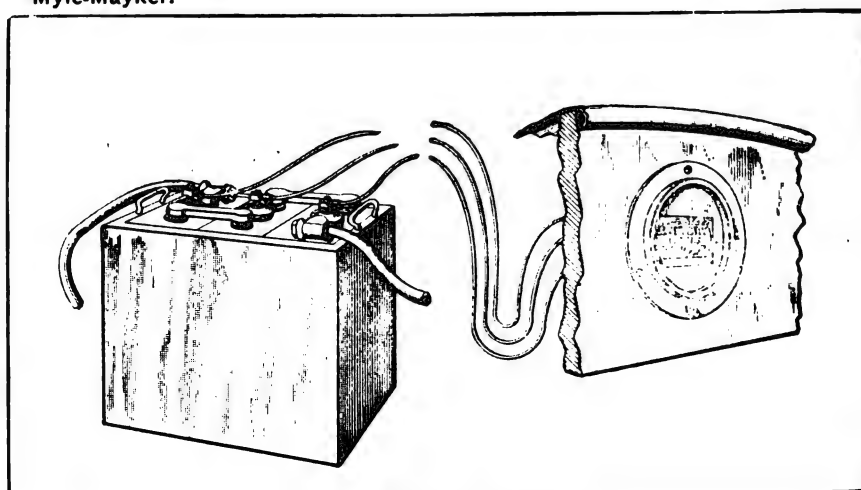
TWO-LITE BULB CASE.

The Dover two-lite bulb case consists of a steel cylindrical tube with a removable cover on each end held securely in place by a bayonet locking device. Each cover when removed has a socket with a spring designed to hold a standard electric headlight bulb. The advantages claimed for this arrangement are, absolute protection for the bulbs, convenience and small space.

Manufactured by Dover Stamping and Mfg. Co., Cambridge, Mass. Price, 40 cents each.

BATTERY PROTECTOR.

The failure of many storage batteries may be attributed to lack of electrolyte. The manufacturers claim that such a failure is immediately indicated by the



Pierce Battery Protector.

Pierce battery protector. This device consists of a dial which is designed to be applied to the dash and as soon as the electrolyte in the battery gets low the dial is automatically turned to indicate, as shown in illustration.

Manufactured by A. S. Pierce, 102 S. Perry Ave., Peoria, Ill. Price upon request.

KING ANTI-RATTLER.

The "rubber heel of silence" as it is called by the manufacturers, is designed for application to the Ford car spindle joint as indicated in the illustration. It consists of a bent arm which is fastened to the steering tie rod and to the spindle joint. Its function is to place a permanent check to rattling at this point, which will sooner or later result in trouble. Aside from preventing trouble and wear this device eliminates the annoyance caused by rattling and squeaking joints.

Manufactured by the King Specialty Mfg. Co., Brookline, Mass. Price \$1 per pair.

MICRO PISTON RINGS.

A ring which is made in two parts and designed to entirely eliminate piston compression leakage, is sold under the name Micro Pressure-tight Ring.

Referring to the illustration, the outer ring seals the opening in the inner ring, and it is said that an equal expansion against the cylinder wall in all directions, producing perfect contact at every part, is obtained.

Manufactured by Micro Piston Ring Co., Inc., 1960 Broadway, N. Y. Prices upon application.

BRITTON DRAIN COCKS.

The illustration shows the Britton priming cups and drain cocks. The cross sectional cuts show the simplicity of design and the self-contained features. Any pressure on the stem tends to seat the valve rather than to off-seat it, consequently, as pressure increases, the valve becomes tighter. Due to the combination of the cone seating and threading of the stem, both devices have a self-locking effect.

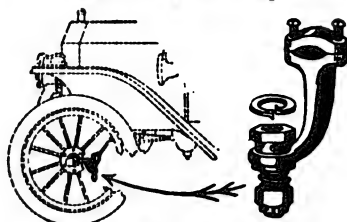
Manufactured by Peter A. Frasse & Co., Inc., 417-421 Canal St., New York, N. Y. Prices upon request.

PILLSBURY AUTOPUL.

The Pillsbury Autopul is a device designed for attachment to the rear wheel or wheels for utilizing the power of the car or truck for pulling it from mud, sand or snow. The nuts which fasten the rear wheels to the flange are replaced by specially designed heads. The Autopul may be slipped over the heads when it is to be used and when given a slight turn it is ready for use. A cable is slipped through a hole in the drum and fastened to a tree, post or stake. When the engine is started, the clutch thrown in, the rope is wound around the Autopul, thus pulling the car forward upon its



Micro Piston Ring.



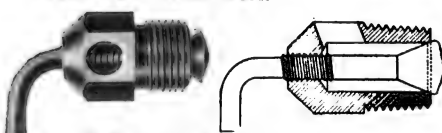
King Anti-Rattler.



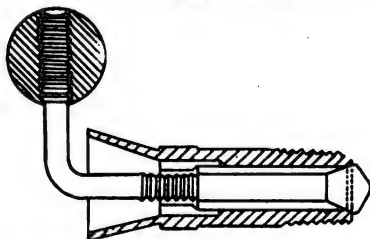
Universal Test Clips.



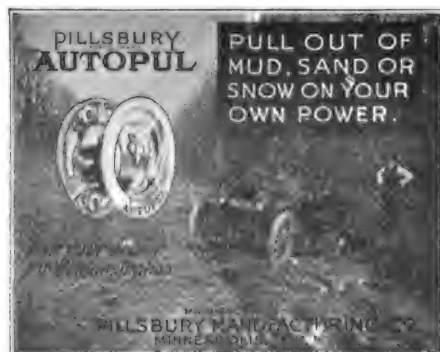
Flexo Laminated Belt.



Britton Drain Cocks.



Britton Priming Cups.



Pillsbury Autopul.

own power. If neither wheel has traction, two Autopuls will be necessary, one on each rear wheel. This device is also useful in pulling another car or truck from its helpless position by jacking up one or both rear wheels of the equipped machine, allowing them to revolve free from the ground, anchoring it and using the Autopul as a capstan.

Manufactured by Pillsbury Manufacturing Co., Minneapolis, Minn. Send for prices and special dealers' proposition.

UNIVERSAL TEST CLIPS.

A great deal of time is often wasted with faulty battery and electrical connections. The Universal test clips are made with spring jaws fitted with sharp teeth, which bite through dirt and corrosion on terminals and make contact with the metal. The trouble caused by loose connections is eliminated with this form of contact.

Manufactured by R. S. Mueller & Co., 431 High Ave., S. E., Cleveland, O. Prices upon request.

FLEXO LAMINATED BELTS.

Flexo laminated V shaped belts fill a long felt need for a strong, smooth acting fan belt. Flexo belts are made in sections cut from solid back belting hides, assembled with steel copper plated rivets and fastened with machine screws and nuts so that they may be readily lengthened or shortened and adjusted. These belts may be obtained in widths from $\frac{5}{8}$ to $1\frac{1}{2}$ inches, and lengths as desired, endless or in rolls of 50 feet, with sufficient rivets and burrs or bolts and nuts for making them endless.

Manufactured by Detroit Leather Works, Detroit, Mich. Prices upon application.

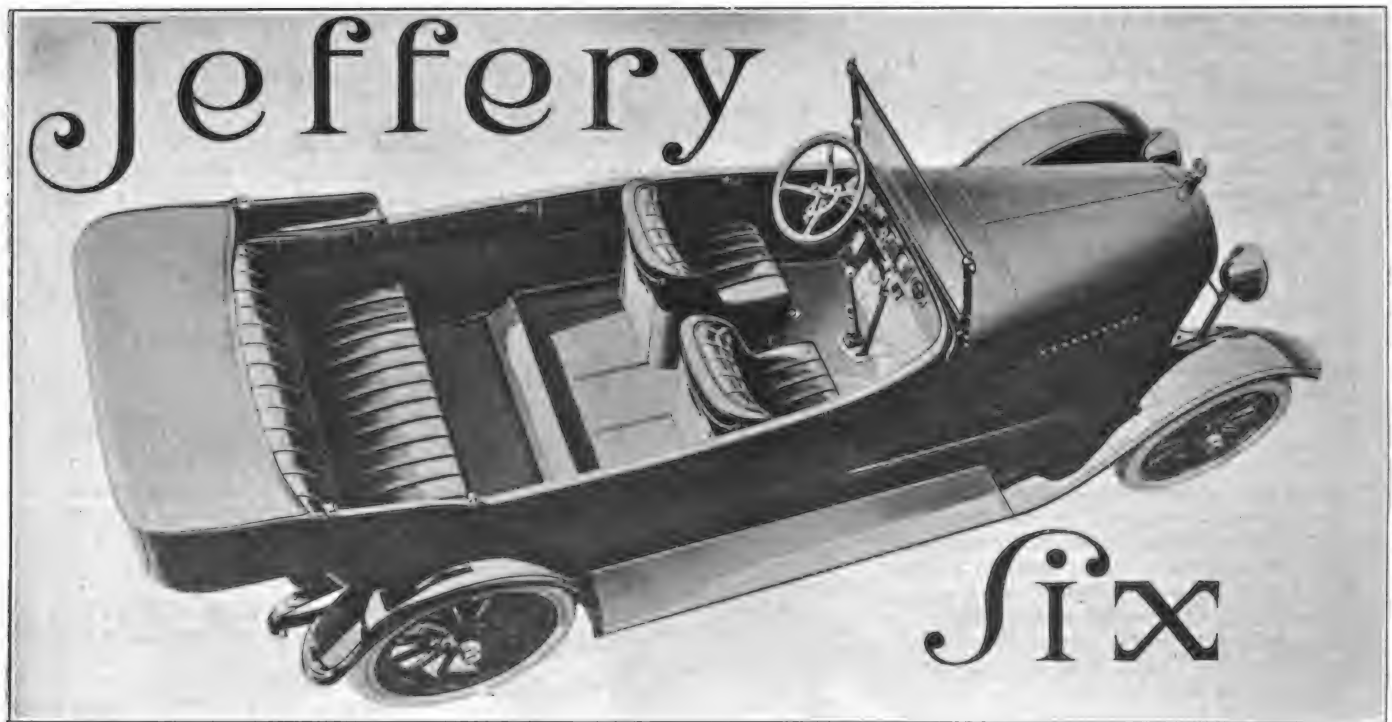
RETLAW FORD CAR GAUGE.

A gauge by which is indicated the number of gallons of gasoline in the tank is a convenient and time saving accessory for any car. Not only handy, but also very practical for determining the actual mileage made upon a certain consumption of gasoline; an important item to watch now that fuel is so high. The Retlaw gasoline gauge for Ford cars is designed to fill this want. This gauge consists of a float mechanism suitably linked to a dial upon which is plainly marked a scale in gallon units. The gauge is very easily and quickly applied and when in place forms the filler cap.

Manufactured by Retlaw Mfg. Co., 812 Woodbridge St., East, Detroit, Mich. Price in U. S., \$1.

FOOT ACCELERATOR.

In the Feb. 25 issue of The Automobile Journal under this heading, by an inadvertence, the warehouse address of the New Era Spring and Specialty Co., 717 Mather street, Chicago, Ill., was given instead of the main office address, which is 864-878 Woodward avenue, Detroit, Mich.



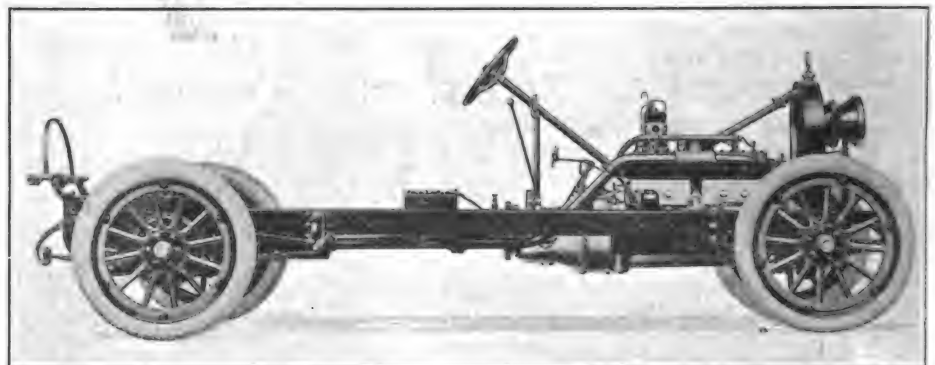
IN THE Jeffery Six, the latest creation of the Nash Motors Co., Kenosha, Wis., the designers have produced a striking model with a low hung, streamline, roll edge body, which gives the impression of hammock slung ease and comfort. The various features blend together to produce an ideal type of arrangement, including the low running board, which affords an easy step into the tonneau, with its suggestion of speed and power, beauty and simplicity.

With 53 horsepower at the call of the operator the occupants realize its quality, the motion of the car becoming perceptible only, as a rule, through the unevenness of the road, the engine, with its oversized, inherently balanced crankshaft being without vibration at any speed.

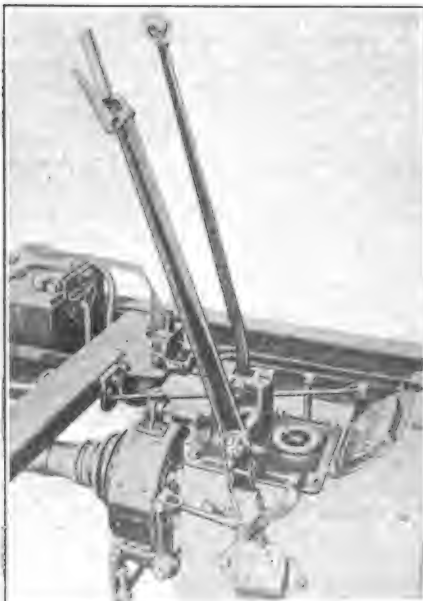
The engine of the Jeffery Six is of the

L head type and consists of six cylinders cast en bloc, having a bore of $3\frac{1}{2}$ inches, a stroke of $4\frac{1}{2}$ inches, with the S. A. E. rating of $29\frac{2}{5}$ horsepower, or 53 horse-

these bearings there is provided an important factor in the long life of the engine. Connecting rods are made of selected drop forged steel, double heat



The Rugged, Simple Chassis of the New Jeffery Six-Cylinder Car.



Emergency Brake on Propeller Shaft.

power manufacturers' rating. The cylinder heads, which are also cast in one block, are removable, affording ready access to the valves and combustion chamber. The pistons are light and are $3\frac{1}{2}$ inches long. The construction of the crank case is in two sections. In the upper part, which is integral with the cylinders, are carried the moving parts. The lower part, which forms the oil reservoir, is removable, thus affording access to the interior for adjustments.

As one point in attaining distinction and efficiency for the Jeffery engine, the crankshaft is made of selected forging steel, .35 to .45 per cent. carbon, double heat treated, of extra size and inherently balanced. The crankshaft journals are $2\frac{1}{4}$ inches in diameter, giving it strength, which prevents distortion at high speeds. It is mounted on extra large die cast babbitt bearings, three in number, the front, centre and rear bearings being $2\frac{13}{16}$, $2\frac{1}{2}$ and $3\frac{1}{4}$ inches long respectively. Through the extra large size of

treated. The caps are fastened by two chrome nickel steel bolts. The bearings are of die cast babbitt, two inches long.

In the interest of giving the engine greater lugging power and higher speed, tappets of a mushroom type are used, which are unusually large, having a diameter at the base of the circle of $1\frac{1}{4}$ inches, providing a factor which allows a wide and rapid valve action. The design for cam action permits the use of a single camshaft, suspended on four babbitt bearings and driven by a silent chain $1\frac{1}{4}$ inches wide. All valves are located on the right side of the engine and are of the poppet type, completely inclosed, but easily accessible by removing cover plates on the side of the cylinders.

The lubricating arrangements include a specially designed force feed system. Oil is forced to all camshaft and crankshaft main bearings and to the driving chain by a gear pump, which is driven by bevel gears from the camshaft. Other

parts of engine are lubricated by splash from connecting rods, which dip into pans at the lower ends. The operator is kept informed as to the proper working of the system by a sight feed oil gauge on the instrument board.

In the arrangement of the cooling system there is a water pump used, mounted upon the cylinder block, which forces the water through the radiator. Radiation is increased by a two-blade aviation type of fan, which is mounted on an adjustable casting and driven by a belt from the timing shaft.

An automatic vacuum gasoline feed carburetor, which is of the standard float feed type, is heated by an exhaust manifold connection.

Current for ignition is furnished by a single unit Delco high-tension magneto with manual control. The magneto is mounted on the right side of the engine and driven through flexible couplings by the same shaft by which the water pump, fan and generator are driven.

The engine is mounted directly upon the main frame and suspended at three points; it forms a unit with the transmission gearset and clutch. The clutch is of the three-plate dry disc type, one



The Touring Car, Strong in Line and with 125-Inch Wheelbase.

seven leaves upper and eight leaves lower, underslung on the rear axle. The main leaves are made of chrome silico manganese steel. All springs are lubricated by compression grease cups.

The frame is made of channel, pressed steel, heat treated extra deep, very rigid and provided with four cross bars. The side rails are extended at the rear to provide a support for the gasoline tank and

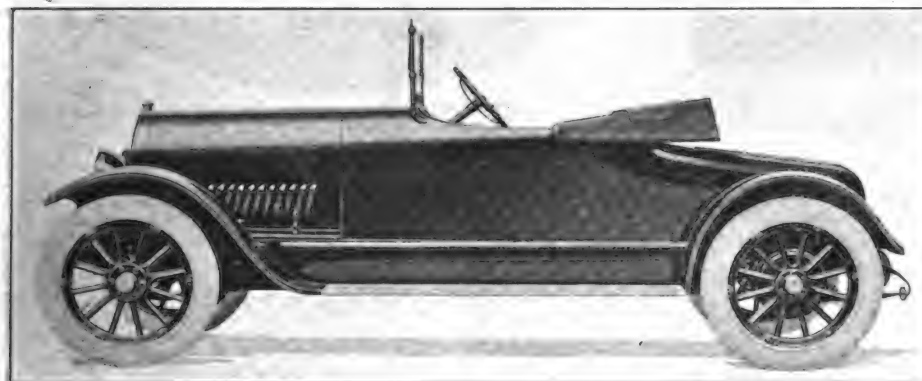
located at the centre of the car. The emergency brake acts upon a drum mounted on the propeller shaft at the rear of the transmission gearset. It is external contracting and simple in design. The service brake, which is operated by foot pedal, acts upon a drum 14 inches in diameter, two inches wide and is also external contracting.

Current for lighting and starting is furnished by a generator with a six-volt storage battery floating on the line. It is a two-unit system.

Four body types are offered, seven-passenger touring, sedan and sedan combination, and a two-passenger roadster, at the following prices respectively, \$1465, \$1630, \$1690 and \$1435.

All the bodies are of streamline roll edge form, hammock slung. In the seven-passenger cars the auxiliary seats fold and disappear into backs of front seats.

The standard equipment consists of rain vision slanting windshield, foot rest in tonneau, extra rim and carrier, complete set of tools, electric horn, motometer, electrically lighted instrument board on which are mounted the speedometer, generator indicator, oil sight feed gauge, ignition and lighting switches and fuse box, carburetor adjusting device. The headlights are equipped with small bulbs for dimming lights. A one-man top anchored to the windshield with jiffy curtains completes the equipment.



The Six-Cylinder Roadster, Model 671.

steel and two asbestos friction discs mounted in the flywheel and completely enclosed by the engine housing.

The transmission gearset, which forms a unit with the engine, is of the selective sliding gear type, three speeds forward and reverse. Gear ratios are 14.6 to one for low, 8.2 to one for second, 4.5 to one for high and 19.5 to one for the reverse.

The rear axle, which is of the semi-floating type, is made with a malleable iron centre member with extra strong alloy steel tubular ends. Differential is readily removable by taking off the rear cover. The drive from transmission gearset to rear axle is through two universal joints and shafts. The drive is of the Hotchkiss type, all drive and torque being taken through the rear springs. With this feature all radius rods are removed.

The front axle is a one-piece, drop-forged, special analysis, I beam, forged in one piece, having a clearance of 9½ inches and fitted with taper roller bearings of case hardened nickel steel.

The front springs, which are semi-elliptic, are 38 inches by two inches and are composed of eight leaves. The rear are ¾-elliptic, 53 inches by two inches,

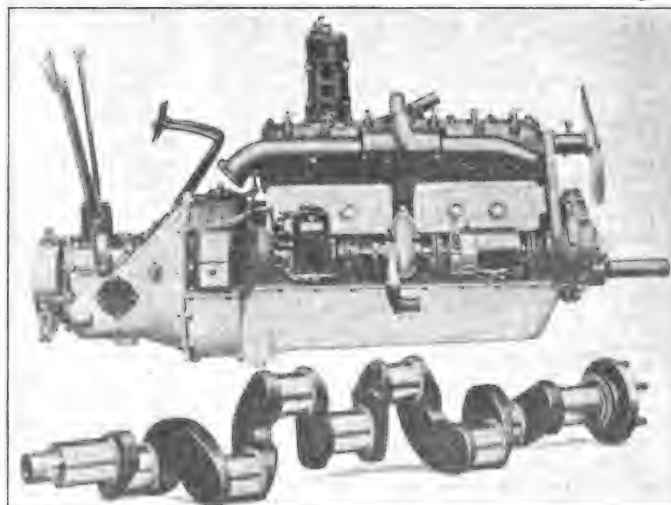
spare tire. The width of the frame over the front axle is 30 inches, over the rear 31¼ inches.

All wheels are of the artillery type and made up of 12 1½-inch spokes and fitted with detachable type rims. Tires are straight side, 34x4 inches, front plain, rear all weather tread.

Although the wheelbase is 125 inches, the makers claim that it is possible to make a turn within a 42-foot circle with the greatest ease.

The steering gear is mounted on the left side of the car and is of the worm and wheel type, irreversible. Steering knuckles are made of chrome nicked steel.

Gear shift lever and emergency brake lever are



L Head Type Engine; Oversized Inherently Balanced Crankshaft of the Jeffery.



Upper Oval, Litchfield Avenue, Industrial Village of Goodyear, Conn.; At Left, Hotel; Lower Square, New Warehouse Rising in Foreground; Oval, Mill with Framework of Card Room Annex.

The Business Side of the Motor Vehicle Industry

The Goodyear Tire and Rubber Co., Akron, O., is expanding its cotton manufacturing plant at Killingly, Conn., and an industrial settlement will be established providing quarters for a large force of employees. Several groups of dwellings are now under construction and a 60-room hotel has been completed. The plant is known as the Goodyear Cotton Mills, Inc., and is located on a site of 276 acres. It is proposed to change the name of the village of Williamsville, where it is located, to Goodyear.

The Continental Motors Corp. has declared a dividend of 1½ per cent. on the preferred stock, payable April 16.

The Peerless Motor Car Co., Cleveland, O., at a recent meeting elected the following directors for the ensuing year: W. M. Coleman, T. W. Frech, F. Gilbert, E. W. Harden, L. H. Kittredge, C. Z. Rich, F. S. Terry, B. G. Cremaire, P. D. Wagoner, Harrison Williams, F. L. Dane, Williams E. Griswold and R. H. Rice. The last three named directors were elected to replace H. L. Hooke, P. D. Sawyer and P. J. McIntosh.

The Bosch Magneto Co., New York, have signed contracts with the following nine prominent automobile and truck makers to use Bosch magnetos during the coming season: Finley Robertson Porter Co., Inc., Port Jefferson, L. I.; Bethlehem Motors Corp., Allentown, Penn.; Larrabee-Deyo Motor Truck Co., Binghamton, N. Y.; Brewster & Co., Long Island City, N. Y.; Roberts Motor Mfg. Co., Sandusky, O.; Kleiber & Co., San Francisco, Cal.; the Winton Co., Cleveland, O.; Jordan Motor Car Co., Cleveland, O.; Sterling Automobile Mfg. Co., Amston, Conn.

The King Motor Car Co., Detroit, Mich., has appointed the following dealers as distributors of King cars: Croft & Son, Mineral Wells, Texas; W. L. Seng, McCool Junction, Neb.; Bennett Auto Co., Norfolk, Neb.; J. R. Cote, Auto Sales Co. of Canada, 88 Crown street, Quebec, Que.; Quathemer

& Lenkins, Defiance, Iowa; Dodd & Tupper, Burlington, Vt.; Bolton Auto Co., Jones and Boone streets, Saginaw, Mich.; H. K. Gibson, Chapin, Mich.; Allen Reed, St. Louis, Mich.; Economy Garage, Middleton, Mich.; I. B. Rowell & Son, Ithaca, Mich.; Grenwald Auto Co., Bay City, Mich.; Charles Bradley, 328 South Sixth street, Springfield, Ill.

The Inter-State Motor Co., Muncie, Ind., has not purchased the Beaver Mfg. Co. of Milwaukee, Wis., as recently reported, but has made arrangements to take over the entire output of the Beaver company for the coming year.

John M. Studebaker of South Bend, Ind., one of the founders of the big automobile business that bears his name, left an estate which is estimated at \$5,000,000. Nearly 60 per cent. of his wealth is said to be represented by his interests in the Studebaker Corp.

The Automobile Owners' Co-Operative Association, which was doing business in Philadelphia has been restrained by the Pennsylvania courts from using the trade mark or initials "A O C A" owing to the similarity it bears to the abbreviation or trade mark "A O S A," the initials of the Automobile Owners' Service Association.

The American Rubber and Tire Co., Akron, O., has increased its capital stock from \$500,000 to \$1,000,000.

A. E. Walden, who resigned from the experimental department of the Chalmers Motor Co. last year to become service manager for C. T. Silver Co. of New York City, has returned to the Chalmers company in the capacity of experimental engineer.

J. W. Crawford, formerly assistant chief engineer of the American Motors Co., and for the past four years connected with the Chalmers Motor Co., has been appointed designing engineer of the latter concern.

The Prest-O-Lite Co., Inc., has appointed the following concerns and individuals

as battery service stations: Seminole Garage, Inc., 43 S. Third street, Mt. Vernon, N. Y.; Bryan Power Co., Bryan, Tex.; Central Garage, Paso Robles, Cal.; Hermanson & Green, 416 G street, Eureka, Cal.; Wetzel & Thomas, Sterling, Ill.; Ukiah Auto Supply Co., Postoffice Bldg., Ukiah, Cal.; B. & B. Garage, Cloverdale, Cal.; Ft. Bragg Garage and Machine Co., 225-239 Main street, Ft. Bragg, Cal.; Mt. Vernon Machine and Motor Co., 816-18 E. Main street, Mt. Vernon, Ill.; George Campbell, 215-19 E. Seventh street, Auburn, Ind.; H. Dawson & Son, Napoleon, O.; George T. Burnette, So. Washington, Rose and Main streets, Rocky Mount, N. C.; London Battery Repair Co., 210 King street, London, Ont., Can.; Mark Guy, 21-25 Main street, Asbury Park, N. J.; Riverside Motor Car Co., Riverside, Iowa; Tulare Garage, J and Ingro streets, Tulare, Cal.; Morgantown Battery Co., Morgantown, W. Va.; Bittner Machine Works, 510 Main street, Meyersdale, Penn.; Pelton Bros., Dixon, Ill.; Central Auto and Supply Co., North Yakima, Wash.; Madrid Auto Co., Madrid, Iowa; Washington Motor Car Co., Market street, Washington, N. C.; New London Motor Car Co., New London, Wis.; Reed & Logan, Panova, Ia.; Service Auto Co., Beeville, Tex.; A. F. Haberman, Jefferson, Wis.; Eacker Auto Co., Albion, Neb.; Auto Electric and Specialty Co., 218 Grove street, San Francisco, Cal.; San Gabriel Auto Engineering Laboratories, Covina, Cal.; Chas. A. Cushman, 123 Pine street, Burlington, Vt.; Rhode Island Garage Co., Westerly, R. I.; Haverhill Battery Station, Haverhill, Mass.; Durham Buggy Co., Durham, N. C.; H. Otto Vogt, 36 School street, Bristol, Conn.; Pioneer Garage, 418-426 Main street, Red Wing, Minn.; Beckman Electric Co., 130 S. Central avenue, Lima, O.; The Presto Battery Shop, Newton Place, Holyoke, Mass.; Lemke-Mann Motor Co., Bremerton, Wash.; The Auto Electric Service Co., Sixth avenue and Ninth street, Huntington, W. Va.; Motor Service Co.,



A. C. Spark Plug Dinner, Given at the Boston Show, with Albert Champion as Host.

Alliance, O.; Landaal Bros., 111 E. Main street, Johnson City, Tenn.; C. L. Hedenburg, Madison, Ga.; Hallock Auto Co., Hallock, Minn.; The Auto Repair Co., Winston-Salem, N. C.; Green Cross Garage, Ellicott City, Md.; City Garage, 125 E. Jefferson street, Mangum, Okla.; Phoenix Garage, 250 E. Main street, Lexington, Ky.; Fahlers Garage, E. Sixth street, Mendota, Ill.; De Kalb County Auto Co., De Kalb, Ill.

Albert Champion, president of the Champion Ignition Co., Flint, Mich., gave a dinner during the Boston Show to about 150 of the leading jobbers and salesmen of New England. The dinner, which was held in the Hotel Lennox, was one of the most notable events in trade circles during show week at the Hub.

The Pathfinder Co., Indianapolis, Ind., has increased its capital stock to \$5,000,000, divided into \$3,000,000 common shares and \$2,000,000 preferred. The recapitalization does not involve any change of name or change in the personnel of the organization.

The Westcott Motor Car Co., Springfield, O., announce a higher price schedule, which will go into effect on May 1. The four-passenger roadster and the five-passenger touring car, which now sell at \$1590, will be increased to \$1790, and will be equipped with 35x4½ tires, instead of with 34x4, as at present. The seven-passenger touring car will be advanced from \$1690 to \$1790. The Westcott Springfield five-passenger touring sedan, which now sells at \$2090, will be increased to \$2290, and will include 35x4½ tire equipment instead of 34x4 tires as at present. The seven-passenger Westcott Springfield touring sedan will be increased from \$2190 to \$2290. This new schedule makes all the open type models after that date \$1790 and all the enclosed types \$2290.

The Texas Co., New York City, during the last six months of last year, made gross earnings of \$20,996,119, and its operating expenses during the period were \$13,275,621. The net earnings for the six months were \$7,720,498, and \$4,924,000 was added to the surplus, making a total surplus on Dec. 31 last of \$30,002,849.

The Fifth Avenue Coach Co., New York City, made gross earnings during the six months ending Dec. 31 of \$1,107,159. The operating expenses were \$788,155, leaving a profit of \$319,004, which compares with \$439,351, the total earnings for the year ending June 30, 1916.

N. W. Akimoff, formerly chief engineer of the Dynamic Balancing Machine Co., Philadelphia, Penn., has opened offices in the Harrison building in that city as a research engineer.

The National Motor Car and Vehicle Co., Indianapolis, Ind., has advanced prices \$100 on each model. The schedule of prices is as follows: Six-cylinder roadster, touring and phaeton, \$1850; six-cylinder coupe, \$2500; Springfield body, \$2450; 12-cylinder roadster, touring car and phaeton, \$2250; coupe, \$2900; Spring-

field body, \$2850.

The Abbott Corp., manufacturers of the Abbott-Detroit car, has moved into its new plant at Cleveland, O., where increased space is provided for increasing the production of cars for the coming season. The plant is located at 152nd street and next to the tracks of the Nickel Plate railroad and close by the Chandler, Jordan and General Electric Company plants. The Detroit plant has been abandoned, all the equipment and facilities having been moved to Cleveland.

The Bosch Magneto Co. will hereafter concentrate its offices and manufacturing activities at the Springfield, Mass., plant. The advertising department and branch distributing office will be retained in New York City.

H. M. Applegate has been appointed assistant sales manager of the American Motors Corp., Plainfield, N. J. He is also advertising manager of the company and has headquarters at 141 Broadway, New York City.

Carl H. Kloo, Jr., has returned to the United States Motor Truck Co., Cincinnati, O., as assistant general sales manager. Several years ago Mr. Kloo left the company to join the sales forces of the National Cash Register Co. He was called back to take charge of the sales promotion department.

The Billings & Spencer Co., Hartford, Conn., has declared a quarterly dividend of two per cent. and extra dividend of three per cent., which was paid on April 2.

William T. White, son-in-law of the late Ferdinand W. Roebing, director of the Mercer Automobile Co., received the latter's stock interest in the company. Mr. White has been general manager of the Mercer Company for a number of years. The Roebing estate is estimated at over \$20,000,000.

H. R. Cooley has been appointed sales manager of the Mutual Motors Company, Jackson, Mich. He will immediately start on a tour of the country to confer with all distributors of the Marlon-Handley.

The New Departure Manufacturing Co., Bristol, Conn., has inaugurated a new house organ which is to be known as "New Departure News." The first number has a picture on the cover of De Witt Page, the president of the company, who is editor in chief of the publication.

The International Motor Car Co., Allentown, Penn., will enlarge its plant in that city by the addition of an assembling building, 240x50 feet. Two other shops, 50x54 feet and 50x70 feet respectively, for stock and machining purposes, are nearing completion.

F. C. Chandler, president of the Chandler Motor Car Co., in a statement sent out to the stockholders, says that the company earned 83 per cent. more during the three months of 1917 than in the corresponding quarter in 1916. The net earnings for the period are between \$9 and \$10 a share.

The Hawley Motor Devices Co., Wilmington, Del., has been organized with a

capital of \$2,000,000 to engage in the manufacture of a gas generator substitute for carburetors on gasoline motors.

The White Motor Co., Cleveland, O., reports net earnings for the year ending Dec. 31, 1916, of \$3,701,041, or \$11.56 a share on the 320,000 shares of \$50 par value. The earnings statement for the year was as follows:

Net earnings of selling, manufacturing, other ex.....	\$4,087,027
Other income, discounts, dividends, etc.....	254,014
Profit for year.....	4,441,041
*Reserves	740,000
**Balance	3,701,041
Dividends paid during year...	1,160,000
Surplus	2,541,041

*Reserve set aside to reduce value of inventory to value based on prices current Dec. 31, 1915.

**Equivalent to 23.13 per cent. on \$18,000,000 stock outstanding, or \$11.56 a share on 320,000 shares of \$50 par value.

Current assets as of Dec. 31, 1916, were \$11,674,873, and current liabilities \$1,597,267, leaving net working capital \$10,095,606.

The Chalmers Motor Co.'s factory in Ford City, on the Canadian side of the river, was burned to the ground on March 31 by a fire which started in the finishing room. About 40 completed limousines, in addition to other machines, were destroyed. The loss is estimated at \$250,000.

The Marlin Arms Co., New Haven, Conn., has bought the manufacturing plant and business of the Mayo Radiator Co. of Hamden. This makes the third industrial plant that the Marlin company has taken over within a short while, the other two plants being the Rockwell-Drake Co. of Plainville, Conn., and the Standard Roller Bearing Co. of Philadelphia.

The Goodyear Tire and Rubber Co., Akron, O., had net assets on Jan. 30, 1917, of \$46,600,000, or over \$232 for each share of the preferred stock.

Elmer F. Twyman, Jr., has been elected vice president, treasurer and general manager of sales of the R. E. Taylor Corp., sole distributors of Gramm-Bernstein motor trucks in 12 eastern states. Mr. Twyman was manager of the Boston branch of the company. He has been succeeded by E. E. Mears.

Chester I. Campbell, secretary of the Boston Automobile Dealers' Association, has been elected president of the new Back Bay National Bank, which will have quarters on Massachusetts avenue. The capital of \$200,000 and \$50,000 surplus has been subscribed. Automobile men in Boston have organized the Back Bay National Bank to cater to the needs of the motor trade in that city.

A. F. Peterson has been appointed manager of the San Francisco branch of the Flisk Rubber Co. For the next two years he has been the Flisk traveling representative in Northern California and Nevada.

The Darling Motor Co., Dayton, O., which was recently formed to make a new pleasure car, designed by James Guthrie, has purchased the plant of the Wright-Martin Aeroplane Co. in that city. The chassis on which all body types will be fitted has a 130-inch wheelbase and is equipped with a model 7-N Continental six-cylinder engine, $3\frac{1}{2} \times 5\frac{1}{4}$; Timken axles, Borg and Beck disc clutch, Stromberg carburetor, Bijur starting and lighting, Kellogg tire pump, Atwater-Kent ignition, Stewart vacuum feed, Conaphore lenses, Boyce motometer, demountable wire wheels.

The Stewart-Warner Speedometer Corp., Chicago, Ill., has brought suit in the United States District Court against the Auto Parts Co., Chicago, distributors of the Thermos vacuum fuel feed system, which is made by G. F. Weinberg, Detroit, Mich. The suit is similar to the others recently brought by the Warner corporation, based on the Webb Jay patents.

The Cruiser Motor Car Co., recently formed to manufacture a special type of cars for campers with a camping outfit included in the equipment, will erect a plant at Joliet, Ill. The officers of the company are: President, W. J. Burdick; vice president, R. G. Jones secretary, D. S. Bobb; treasurer, W. E. Burdick.

Theodore Friedberg and associates have purchased the entire holdings in the Loxler Motor Co. that stood in the names of Samuel and Harry Frank. Mr. Friedberg is president of the company and the Frank brothers held the positions of vice president and treasurer respectively.

The Republic Rubber Co., New York City, has moved its general offices to the Singer building in that city, including the mechanical sales, export sales, railroad sales and exporting departments. The present pneumatic tire sales department and storage rooms will be continued at 229 West 58th street.

The Goodyear Tire and Rubber Co., Akron, O., is planning the erection of a large club house for its employees, which will have a swimming pool, large auditorium, rifle range, shower baths, bowling alleys and club rooms. It will be known as Goodyear hall and will be devoted to the amusement and recreation of the 19,000 Goodyear employees.

The National Tire and Rubber Co., East Palestine, O., has been taken over by a new corporation of the same name with a capital of \$1,000,000. A syndicate of capitalists identified with the rubber industry organized the new company, which plans to increase the production 300 per cent. within the next two months. Officers of the company are: President, C. L. Merwin; vice president and general manager, S. L. Warner; secretary, E. N. Herrick; treasurer, R. B. Taggart.

George R. Cullen, formerly of the advertising department of the Hudson Motor Car Co., has joined the advertising staff of the Chalmers Motor Co. under W. L. Agnew, director of advertising. Mr. Cullen will have charge of writing the "Chalmers Monogram," the Chalmers publication for dealers.

The Parker Rust-Proof Co. of America, Detroit, Mich., will erect branch factories in most of the large cities of the United States. Two factories will be erected in each of the following cities: New York City, Chicago, Brooklyn and Philadelphia. One plant will be built in each of these cities: Buffalo, Syracuse, Pittsburg, Altoona, Penn.; Boston, Worcester, Hartford, Bridgeport, Providence, Newark, Baltimore, Milwaukee, Indianapolis, St. Louis, Minneapolis, St. Paul, San Francisco, Kansas City and the following Ohio cities: Cleveland, Cincinnati, Columbus, Dayton, Toledo and Youngstown. The Cleveland plant has been in operation for some time.

The Goodyear Tire and Rubber Co., Akron, O., has announced a number of changes in branch managerships which have already taken effect. Mr. E. B. Sigerson, for several years manager at Buffalo, N. Y., has been taken into the automobile tire department at the factory. C. M. Klopp, special motor truck representative at Syracuse, N. Y., is promoted

to branch manager at Buffalo, N. Y. J. E. Taylor of the automobile tire department at Akron, has been appointed manager at Charlotte, N. C. M. Orr, former manager at Charlotte, becomes manager of the branch at Syracuse to succeed W. C. Blake, who has been appointed branch manager at New York City. P. W. Smith resigned the managership of the New York office to take up other work.

The Auto Parts Co., Chicago, Ill., has been granted a perpetual injunction against the Auto Sales and Parts Co., also of that city, enjoining the latter from using a name similar to the plaintiff's, which claimed that the similarity in the defendant's name resulted in a business loss. Since the suit was started the Auto Sales and Parts Co. changed its name to the Auto Needs Co., and under that name has taken an appeal from the decision of Judge Charles M. Foell of the Superior Court of Cook county, who presided at the trial.

The Disco Electric Starter Corp., Detroit, Mich., have granted more territory to the Brown-Hare-Parsons Co. in the distribution of their new "Disco" two-unit starting and lighting system. They now control Michigan, Ohio, Illinois, Wisconsin, and have secured in addition the states of Pennsylvania and West Virginia.

F. W. Solarek, formerly representative of the Elyria Iron and Steel Co. in Ohio and Western New York state, is now rep-



Charles D. Jenney, Inventor.

representative of the same company in Michigan, with headquarters at 1934 Dime Bank building, Detroit.

Charles D. Jenney, head of the Jenney Electric Manufacturing Co., has perfected the application of a new principle which successfully uses kerosene for fuel in internal combustion engines. It is understood that he will give a practical demonstration of his discovery in Detroit in the near future. Mr. Jenney was recently appointed chief consulting engineer for the Detroit Motor Lock Co., makers of the Detroit Cartridge Lock.

The Equipment Service Association has been formed with the object of preparing and adopting a set of service reports and forms to be used in service stations. The promoters of the association are service managers and representatives of eight manufacturers of electric lighting and starting systems. The first meeting was held at Toledo, O., and the next meeting will be held in Atlantic City, Sept. 11 and 12. The officers are: President, D. W. Burke of the Westinghouse Electric and Manufacturing Co.; secretary and treasurer, R. A. Hall of the Electric Autolite Co. The companies whose representatives have become members of the organization are: Electric Autolite Co., Toledo, O.; Westinghouse Electric and Manufacturing Co., Pittsburg, Penn.; Bijur Motor Light-

ing Co., Hoboken, N. J.; U. S. Light and Heat Corp., Niagara Falls, N. Y.; Wagner Electric Manufacturing Co., St. Louis, Mo.; Dayton Electric Laboratories Co., Dayton, O.; Gray & Davis, Inc., Boston; A. B. C. Starter Co., Detroit.

The Hayes Mfg. Co., Detroit, Mich., reports earnings of \$55,947 net in January, and the balance sheet shows assets of \$2,192,124.

The Ford Motor Co., Detroit, Mich., is reported to be over 100,000 cars behind in its orders and the pressure on the factory facilities to get out pleasure cars has caused the management to temporarily postpone the production of Ford trucks that had been planned.

E. G. Crawford, formerly district manager for the Regal Motor Car Co. in Ohio, has been appointed sales promotion manager in the Detroit offices. He succeeds Ray W. Donahue. Gordon Dawson, formerly Regal district manager for Michigan, will in the future be head of the Regal Motor Sales Co. E. J. Curren, who has been in the middle west territory, will succeed Mr. Dawson.

W. J. Chilcote has formed the Chilcote-Nash Co. at Seattle, Wash., where he will maintain headquarters for a distributing agency in the northwest for the Nash Motors Co., Kenosha, Wis.

The Electric Storage Battery Co., Philadelphia, Penn., during the past year made total gross sales of \$2,069,977, an increase of about \$300,000 as compared with the previous year. The operating expenses were \$751,181, leaving a net of \$1,318,796 from which dividends of \$649,964 were paid, leaving a total surplus at the end of the year of \$2,318,685, an increase of approximately \$900,000.

The Kelsey Wheel Co., Detroit, Mich., reports gross sales for 1916 of \$8,178,921 and net profits during that period of \$858,639. At the end of the year the balance sheet showed assets of \$14,906,674, of which \$10,000,000 is itemized as trade names, patents, good will, etc. The surplus is \$654,419.

The Osgood Lens and Supply Co., Chicago, Ill., makers of the Osgood Lens, which was invented by James R. Cravath, a well known illuminating engineer of Chicago, have organized a selling campaign under the direction of A. C. Faeh, formerly advertising manager of the Baker R. & L. Co. of Cleveland, O.

The Holmes Automobile Co., Canton, O., has been organized with a capital of \$2,500,000 and will engage in the manufacture of automobiles, using air cooled engines. The officers of the company are: President, Arthur Holmes; vice president, C. H. Rockwell; secretary, G. W. Belden. C. G. Herbruck, Arthur Holmes and C. H. Rockwell comprise the executive committee and the directorate is made up of the following personal: C. G. Herbruck, Arthur Holmes, R. E. Bebb, W. C. Laiblin, V. K. Dodge, G. W. Belden and C. H. Rockwell.

The Pathfinder Co., Indianapolis, Ind., has increased its capitalization to \$5,000,000, divided into \$3,000,000 common stock and \$2,000,000 in preferred stock. All of the stock has been underwritten by the A. R. Scheffer Co. There will be no change in the board of officers or men who operate the various departments. The money will be used to enlarge the plant and increase production facilities.

The States Motor Car Co., Kalamazoo, Mich., and the States Motor Car Mfg. Co. also of that city, have been merged into the States Motor Car Co., which has been incorporated under the laws of Delaware with a capital of \$6,000,000. The finance has been handled by Thomas B. Nevin & Son, B. F. Yoakum and some New York capitalists.

The Ninsinger Magneto Co., Cleveland, O., has been incorporated with a capital of \$15,000 by R. H. Lee, W. J. Patterson, F. H. Crew, G. M. Gallagher and F. Caldwell.

The King Motor Car Co., Detroit, Mich., will establish a factory distributing house at Atlanta, Ga.

J. P. Greene has succeeded G. A. Shoemaker as sales manager of the Maxir Silencer Co., Hartford, Conn.

New Features in Briscoe Model B-4-24

THE new Briscoe Model B-4-24, made by the Briscoe Motor Corp. of Jackson, Mich., ranks high in its class in outward appearance, riding qualities and mechanical efficiency. The engine, which is termed "the half million dollar motor," is a feature of this model. It is of the four-cylinder, L head type, with a bore of 3 3/16 inches and an exceptionally long stroke of 5 1/4 inches. The makers state that it is the longest stroke engine in the country today, and is capable of all the speed that may be desired. Due to this exceptionally long stroke and high speed, though the S. A. E. rating is but slightly over 16 1/4 horsepower, 24 horsepower is the manufacturer's rating.

Cast en bloc the cylinders form a unit integral with the crank case. The water cooled heads, also cast in one block, are detachable, affording access to valves and combustion chambers.

In the upper part of the crank case are carried the crankshaft and the camshaft; the lower forms an oil reservoir. The crankshaft, which is exceptionally large, balanced and accurately ground, is supported and rotates in babbit lined bronze back bearings. The camshaft is drop forged of the best steel and heat treated. All valves, which are on the right side of the engine, are completely enclosed and have a diameter of 1 7/16 inch in clear.

The lubricating service, which is compact and efficient, is operated upon the force and splash system. From the crank case base oil is forced by a pump to main bearings and gears, and is observable through a rotary indicator exposed through the toe board. By this means



Briscoe Four-Passenger Roadster—\$685—Completely Equipped.

The operator is kept at all times informed as to the working of this important system.

One of the reasons for the thermal efficiency of this engine is the special size of the cellular radiator and the water passages through which the cooling liquid circulates on the thermo-syphon system. Radiation is furthered by a reinforced steel fan of special design, rotating on ball bearings, mounted on an adjustable bracket and driven from the camshaft. The makers call particular attention to the cooling system, and its relation to the efficiency of the engine. With their method and design they claim that over heating is prevented.

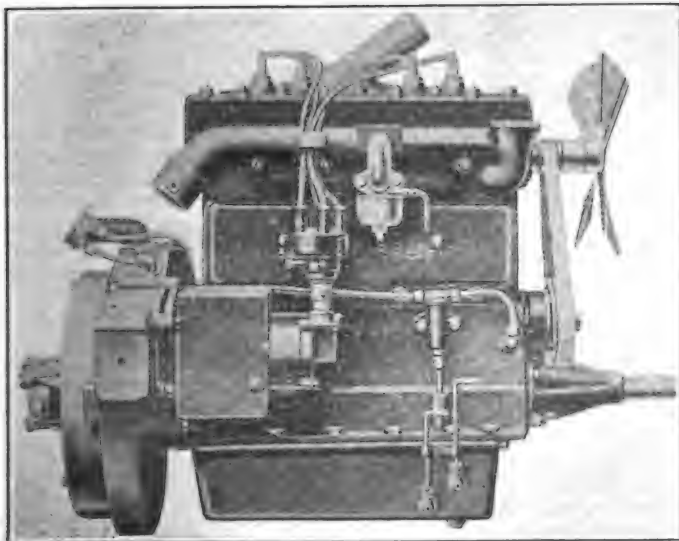
Taking into consideration the high cost of fuel and the relatively high vaporizing point, every possible innovation was incorporated into the design of the fuel system. The carburetor, which is of the automatic float feed type, is mounted high on the engine and bolted directly to the manifold. From it gas is drawn to the engine through a carefully designed and smooth manifold. All unnecessary curves and sharp bends are carefully eliminated in the design.

The ignition system is very simple, the current being distributed by an automatic and manually controlled distributor mounted upon the generator.

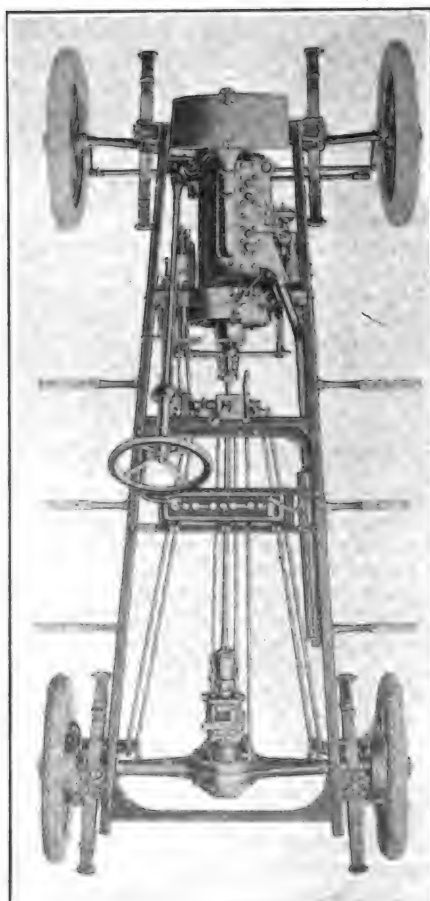
Ease of operation was one of the things that the designer had constantly in mind. It is said, for example, that the clutch works so easily that it can be pushed out with the hand. The clutch, which is carried in the flywheel of the engine, is of the inverted cone type, leather faced, with six spring plungers, which eliminates any tendency to grab and gives a smooth, easy clutch engagement.

From the clutch the power is transmitted to the rear,

through two universal joints and shaft to the transmission gearset, which is housed and bolted to the rear axle. This constitutes a construction which is designed for equalizing the weight of the car and giving an even distribution on all four wheels. The transmission gearset is of the selective, sliding gear type, three speeds forward and reverse. The main shaft is mounted on taper roller and ball bearings; the countershaft on plain bearings. Compactness and unity are attained in the transmission gearset and rear axle. The latter is of the full floating type. The axle shafts are made of 1 1/4 inch steel, mounted on Hyatt roller bearings and enclosed in a solid stamped housing. A drop forged



The "Half Million Dollar Motor."



Chassis, Clean Lined and Rugged.

steel member of I beam section forms the front axle.

Full elliptic springs are used for suspension in the interest of eliminating end sway for one thing, the general tendency being that the movement of one set of springs acts as a shock absorber to the movement of the other set. The frame, upon which the life of the car actually depends, is made of a very heavy channel section, with large, sturdy cross members, so that the whole frame is rigidly reinforced. The 12-spoke wheels are of the artillery type, the best growth hickory being used, equipped with demountable rims and 30 by 3½ inch tires, anti-skid in the rear.

Mounted on the left side of the car, the 16-inch wheel acts through an irreversible worm and worm wheel to the linkage and wheels. Both foot pedals, service brake and clutch are easy in action, and are provided with large pads. The gear shift lever and emergency hand brake lever are located at the centre of the car, at the right of the driver.

A standard make generator with storage battery is used for lighting and starting, the starting motor operating through

STANDARD PARTS GETS WESTERN SPRING AND AXLE.

President Christian Grl of the Standard Parts Co., Cleveland, O., has announced that his company has acquired the Western Spring and Axle Co. of Cincinnati, O. In addition to the Cincinnati plant the Western Spring and Axle Co. also has factories at Canton and Carthage, in the same state, Wheeling, W. Va.; St. Louis, Mo.; Connersville, Ind.; Flint and Pontiac, Mich.

This makes the fourth company that has been merged into the Standard Parts Co., the Perfection Spring Co., Standard Welding Co., Bock Bearing Co. and the Western Spring and Axle Co. The latest acquisition, it is understood, was acquired on an exchange basis, stockholders being given the option of taking either stock in the Standard Parts Co. or cash for their holdings. About \$4,000,000 is involved in the transaction, that being the capitalization of the Western Spring and Axle Co., half common and half preferred.

The latest expansion of the Standard Parts Co. has made necessary an in-

mails to defraud in illegally advertising auto parts before Judge Edwin S. Thomas in the United States District Court at Buffalo, N. Y., and was fined \$2000. Frank Abbott, counsel for Bidwell, entered pleas of guilty for each of the corporations mentioned and each were fined \$1000.

GEAR MANUFACTURERS FORM ORGANIZATION.

At a meeting of a large number of gear manufacturers, held at Lakewood, N. J., on March 25 and 27, a permanent organization was formed to be known as the American Gear Manufacturers' Association. A second meeting will be held at Pittsburg on May 14 and 15.

The association was formed for the purpose of advancing and improving the gear industry in a general way by standardization of gear design, manufacture and application.

The executive committee is composed of the following men: F. W. Sinram, Van Dorn & Dutton Co., Cleveland, O.; H. E. Eberhardt, Newark Gear Cutting Machine Co., Newark, N. J.; F. D. Hamlin, Earle Gear and Machine Co., Philadelphia, Penn.; Frank Horsburg, Horsburg & Scott, Cleveland, O.; Biddle Arthur, Simons Mfg. Co., Pittsburg, Penn.; George L. Markland, Philadelphia Gear Works, Philadelphia, Penn.; Milton Rupert, R. D. Nuttall Co., Pittsburg, Pa.

Officers were elected as follows: President, F. W. Sinram; vice president, H. E. Eberhardt; secretary, F. D. Hamlin; treasurer, Frank Horsburg.

BIRKETT HANDLES "TRACKFORD" PUBLICITY.

W. G. E. Birkett, formerly advertising manager of the Gray Motor Co. of Detroit and the Hoskins Manufacturing Co., has been appointed advertising manager of the Standard-Detroit Tractor Co. of Detroit, manufacturers of the "Trackford" plowing attachment for Ford cars. He will have his headquarters at the offices of the factory, 1506 Fort street, West Detroit, Mich.

FORD GETS BRITISH TRACTOR MONOPOLY.

The Ford Motor Co., Detroit, Mich., has been given advantages in Great Britain that is said to be equivalent to a monopoly according to complaints made by British manufacturers of agricultural tractors to their government. The Ford company is now erecting a large factory in Great Britain which, it is understood, will be devoted to the manufacture of the tractors.

AUTOS TO BE TAXED BY WEIGHT IN WEST VIRGINIA.

Beginning May 23, when the new vehicle law goes into effect in West Virginia, automobiles will be taxed according to weight. All automobiles weighing 2000 pounds or less will be taxed \$10 and 25 cents additional will be charged for each additional 100 pounds.



Broadside View of the New Briscoe Model B-4-24.

a Bendix drive to the flywheel.

Four different body types are presented. Five-passenger touring and coach, at \$685 and \$810 respectively; a four-passenger roadster at \$685 and a two-passenger runabout at \$685 comprise the line.

All bodies are exceptionally roomy, the doors are wide and the lines are long, straight and symmetrical, giving a snappy and rakish appearance. A feature of the four-passenger roadster is the swing back, which hangs between the front sections of the seats, and may be swung over to allow access between the front and rear seats, or put into place forming a full back to the front seats. The upholstery is deep and soft, a point of finish always appreciated.

Two electric headlights with dimmers, storage battery, electric tail and dash lights, license bracket, electric horn, one-man top with envelope and adjustable storm curtains, top holder, tilted windshield, speedometer, spare tire carrier with extra demountable rim, robe rail, oil gauge, gasoline gauge, ammeter, pump, jack and a set of tools comprise the equipment.

crease in the board of directors, and President J. E. Hess of the acquired company, W. E. Bock of the Bock Bearing Co., John A. Kling and Mynard H. Murch will be elected to the directorate. An extension of the executive organization of the parent company has also been made necessary and President Grl has appointed the following: Assistant president, R. Finkenstaedt; chief engineer, J. Gutz; director of sales, C. Swander; director of purchases, H. H. Newhom; manager of publicity, J. A. Barben; manager of jobbing department, J. A. Liston.

With its completed organization the Standard Parts Co. becomes one of the largest producers in the world of parts that enter into the manufacture of automobiles, including springs, axles, rims, tubing, bearings, heaters.

ALFRED C. BIDWELL FINED \$2000.

Alfred C. Bidwell, president of the International Automobile League and the International Automobile League Tire Co., pleaded guilty to a consolidated indictment, charging conspiracy to use the mails to defraud and actual use of the

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How Bexley Builds Good Roads

Bexley is one of the finest suburbs of Columbus, Ohio, in a county which has a great many miles of Tarvia roads.

After proper consideration the authorities adopted a Tarvia pavement, as the most suitable type for their needs, on Columbia Avenue, one of their main streets. The photographs show the construction, step by step.

On a concrete foundation a mixture of Tarvia and stone was used for a wearing-surface. The work was done by McGary & Sparks, Contractors, under the supervision of Jennings, Lawrence & Lindsey, Municipal Engineers.

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Both engineers and taxpayers have realized that Tarvia makes an ideal pavement, and, furthermore, that Tarvia is a distinct economy because its use in paving-construction reduces the up-keep cost so much, that this saving actually more than pays for the Tarvia.

Tarvia roads are now used by thousands of communities all over this country. You will find them more economical and satisfactory than any other type.

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This company has a corps of trained engineers and chemists who have given years of study to modern road problems. The advice of these men may be had for the asking by anyone interested.

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3—Spreading the soft, hot mixture in place.



5—Rolling down the mixture with roller.



2—Discharging stone mixed with hot Tarvia.



4—Raking it to level.



6—Applying squeegee coat of Tarvia and covering with fine stone.

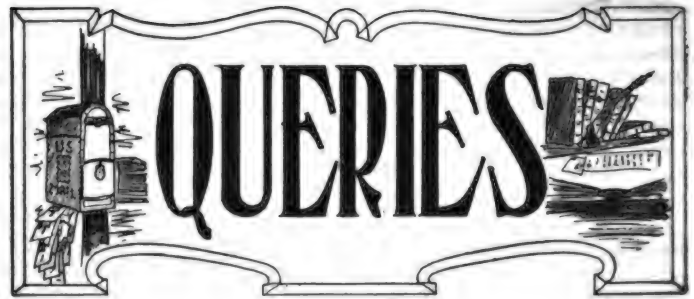
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NOTICE TO READERS.

THIS department contains the Mechanical Editor's answers to readers' inquiries. It is open to every subscriber. If any part of your car is not operating satisfactorily, or if you desire information regarding operating, maintaining or repairing motor cars, do not hesitate to lay your troubles before him. He will answer promptly and fully, either by mail or in these columns, as you direct. This service is free to every subscriber, and is often the means of saving considerable money that otherwise would be spent with a garage man. Letters should always be signed with the writer's full name and address, and the car or part in question should be properly identified, by mentioning the maker's name, model, year of production or other distinguishing feature. Address all inquiries to the Mechanical Editor.

HIS ENGINE SMOKES.

(H. W., Bayonne, N. J.)

I have a Rambler, model 1912, equipped with a Stromberg carburetor, model B 4, 1909. I have recently overhauled the engine and upon reassembling it and trying to start it, with gas cut down in carburetor and lots of air, it misfires in one and four cylinders and smokes very much. If it is given more gas and less air, all four cylinders fire, but it still smokes. When running on second speed there seems to be a grind in the gearset, which is very noticeable. On high or neutral, however, there is no grind. Will you please give me advice on these matters?

Obviously your engine trouble is caused by either excess gas or oil. We will give you the causes and remedies for each.

Too rich a mixture of gasoline may be the cause. You say that you cannot cut down on the gasoline adjustment because as soon as you do this the engine misfires. This may be caused by improperly fitted manifold. This condition results in an excess supply of air around the joints, particularly at the points where the manifold fits the cylinder block. If this is the case more gasoline is required, the resulting gas mixture is too rich, consequently there is imperfect combustion and smoke at the exhaust. Great care is necessary in fitting the manifold to the engine. New gaskets should be used, as the old ones are very apt to be crushed flat and will not adapt themselves to the joint. You will find that with a paste of graphite and oil a tighter joint may be obtained at this point. The bolts with which the manifold is attached to the block should be screwed down uniformly, that is, an equal pressure on each bolt is essential. When screwing them down, begin at one end, and screw down just enough to hold the manifold against the block; then tighten the bolt at the other end of the manifold, then the ones in between; repeat the process, screwing down each bolt in turn about one turn each time until all are tight. By this proceeding you will get even pressure upon all points.

It is essential that all joints between the carburetor and engine are absolutely gas tight. Many repair men locate leaking joints by squirting gasoline on them with an oil can and noting the result in the running of the engine. The same thing applies to the valve guides, which often wear so as to allow air to enter at these points. If you find that the valves do not seem tight in the guides it will be best for you to put in new bushings to prevent this leakage.

If you do not find that the cause for the smoke lies in the manifold connections, it may be in the carburetor. The action of the carburetor on your car should be as follows: The



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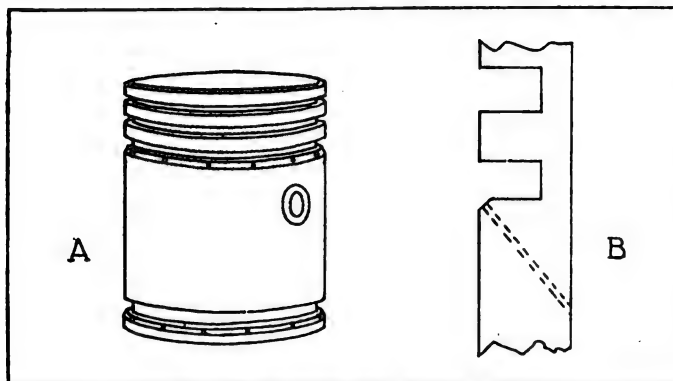
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gasoline, on leaving the float chamber, is drawn up through a nickel alloy nozzle at the centre of the carburetor and mixes thoroughly with the air passing through the venturi tube (the lowest air inlet). As the engine speed increases the air entering through this tube is insufficient and the auxiliary air valve at the top of the carburetor is opened by the vacuum. The automatic auxiliary valve is held closed by two springs, each of which is independently adjustable. The light or low speed spring is the first to be forced downward, as the engine speed increases; the second or heavier spring is compressed and more air is admitted. Should the tension of either of these springs be too light, too much air would be admitted at low speeds and the engine would misfire. Should the tension on either of these springs be too heavy, not enough air would be admitted and the engine might give off smoke. The lighter spring should be adjusted with the engine throttled down; then the heavier adjusted with the engine speeded up. Such an adjustment can only be made by experiment.

In general, with a little practise you can differentiate between smoke caused by excessive gasoline and excessive oil supply. In general, smoke caused by excessive gasoline supply is blue; that from oil is heavy white.

If smoke is caused by excessive oil in combustion chamber, it may be from any or all of the following reasons: Oil leaking past pistons; too much oil in base of engine; too rapid supply from the pump and too light a grade of lubricant.

In your case the oil level in the crank case should not be above the test cocks, which are fitted to the right side of the crank case. The pump should supply oil to the different points in about the following proportions: One drop to each cylinder, one drop to front and rear crankshaft bearings and



Illustrating Method of Boring Pistons.

two drops to centre crankshaft bearing. When you overhauled the engine you might have changed the oil pump adjustment so that excess oil is supplied by it. Another thing which you might have done when you put the engine together again was to change the location of either the pistons or the rings. As the car has probably been run for rather a great distance, the rings have worn into shape in relation to the cylinders. By putting the rings in a different cylinder, or turning them around on the piston it is possible that you have so changed them around as to allow excessive leakage of oil by them into the combustion chamber. The remedy for such a condition is a set of new rings, which do not cost very much, or a set of so called leak proof or compression proof rings. This may help matters. Though there is nothing positive about it, the cylinders may be worn out of round or scored. Dixon's graphite is recommended by the Joseph Dixon Crucible Co., Jersey City, N. J., for increasing compression and filling up scratches in cylinders. Some manufacturers find that it is possible to drain off surplus oil from the cylinders by boring the pistons. We gave directions for this in our Feb. 25 issue. We repeat cut herewith. Holes are about 1/16 inch in diameter, spaced about one inch apart on the circumference. The bevel shown is just enough to permit easy drilling of the hole. Illustration clearly shows the method.

The grind in your transmission gearset may be caused by either of two things. A worn out second speed or drive gear, or imperfect alignment of shafts. Practically the only remedy for the first is to replace the gears in question. If there was no grind before you disassembled the gearset, the grind is

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Motor car buyers must soon decide which they will do without—leather in shoes or leather in automobiles.

DuPont Fabrikoid Motor Quality offers the best solution to the problem. More cars are now upholstered in it than in any other material.

Those automobile makers still using split leather acknowledge to us that it is inferior to Motor Quality Fabrikoid, but they hesitate to adopt the latter for fear some buyers may still think split (commonly sold as "genuine leather") is better. When buying an automobile tell the dealer you prefer one upholstered in DuPont Fabrikoid Motor Quality. You will get a more serviceable—more lasting and more superior upholstery than split leather and you will do your share in the conservation of leather.

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probably due to improper alignment. The bearing housings at either of the four roller bearings may not be properly forced home. In assembling the case it is possible that you did not clean the surfaces properly and that a piece of grit, packing or waste is between them, so that they do not come together. It may be possible for you to locate this trouble without removing the transmission from the car. Remove the gearset case cover and with the engine running, the rear wheels jacked up and the low speed in, see if you cannot locate the trouble.

BOSCH DUAL SYSTEM. (D. J. M., Greenwich, Conn.)

I should like to know how to connect a Bosch vibrating duplex coil to a Bosch DU4 magneto. On the coil there are four places for wires, but only one on the magneto. Will you please tell me how to connect it? There seems to be a "miss" in the third cylinder, which develops at a car speed of about 35 miles per hour. The plugs test all right with a screw driver. It makes no difference to the apparent speed of the engine when I try this plug with the screw driver. There is an air valve on the intake manifold and when I open it the engine is all right until it gets to 35 mile speed. Can you tell me the reason?

The Bosch Magneto Co. put out two coil systems, as well as two magnetos of the DU4 type. As you did not state what system you have we will explain the differences between them.

The DU4 model 5 Bosch magneto is identified by the fact that the distributor box has but four terminals. This magneto cannot be used with the dual coil for ignition with batteries, but may be used with the Two Independent system.

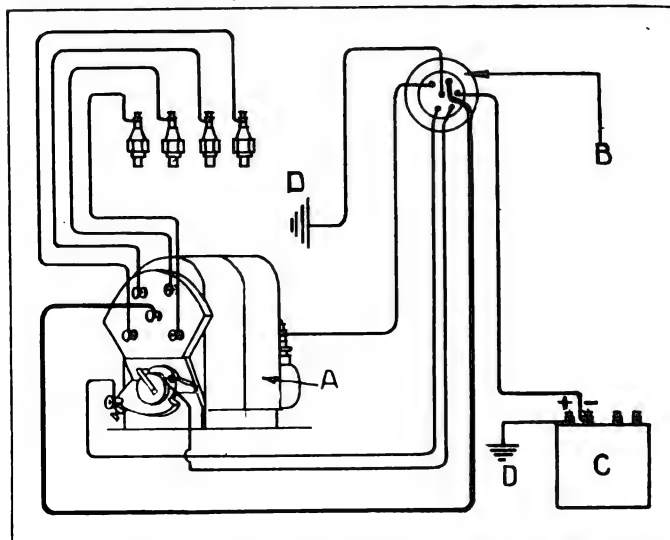
The DU4 dual magneto distributor box has five terminals and may be used with the dual coil and batteries or with the Two Independent system.

The dual coil has six binding post connections and can only be used with the dual magneto as shown in our wiring diagram.

The Two Independent system coil has five binding posts, must be used with an independent timer distributor as shown in our wiring diagram, and an extra set of spark plugs must be provided. The coil you have is probably one unit of the Two Independent system. To use it you will be obliged to obtain a timer distributor and wire as shown in our diagram.

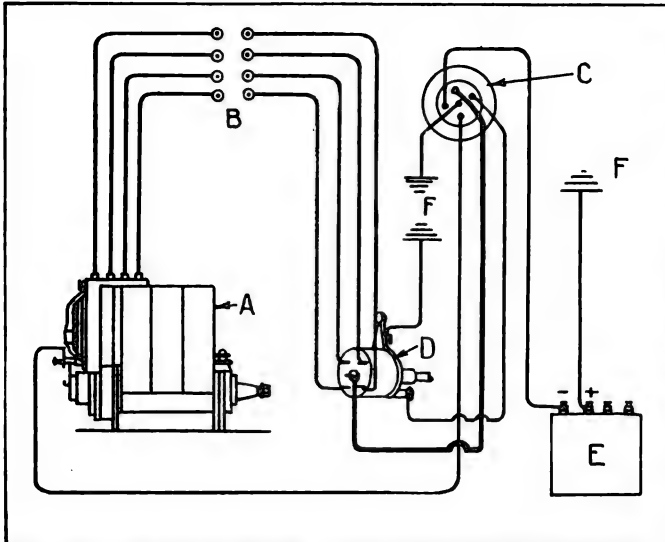
The skip in the engine to which you refer may be due to an improperly adjusted carburetor or a faulty auxiliary air valve in the carburetor. If there is an auxiliary high speed gasoline adjustment, inspect it. The question of proper carburetor adjustment can only be solved by experiment.

You may find that the intake valve in number three cylinder does not open far enough; that is, there is too much clearance between the valve stem and the valve lifter or tap-



Wiring Diagram of Bosch Dual System. A, Dual Magneto; B, Dual Coil; C, Battery; D, Ground Connections.

(When Writing to Advertisers, Please Mention The Automobile Journal.)



Wiring Diagram of Bosch Two Independent System. A, Magneto; B, Spark Plugs; C, Coil; D, Timer Distributor; E, Battery; F, Ground Connections.

pet. This space should be between $\frac{1}{32}$ and $\frac{1}{64}$ of an inch. It will be best to make this adjustment after the engine has been running for a short time and has had time to get heated up.

It will be well for you to examine the manifold connections to be sure that they are a tight fit at all points with the engine block. Also be sure that the valve guides are not so worn as to allow leakage by them.

STORAGE BATTERY INSTRUCTIONS.

(H. R., Homewood, Kan.)

Kindly tell me how to take a Willard storage battery apart, take the top off so I can get the units out, put in, clean electrolyte and put them back again.

You will find that in undertaking to handle such a proposition as the storage battery you have a big job on your hands. Such work can only be handled by a storage battery expert. The efficiency of a storage battery is dependent directly upon the condition of its elements. To change electrolyte, without full knowledge and facilities, will result disastrously. The construction of the storage battery will be explained, emphasizing why home repair work is not practical.

The first step is the removal of the connecting straps. There are three different types. Each consists of a piece of molded lead to which the plates are lead burned or bolted. By lead burning is meant lead fusing, that is, the lead parts are melted together so as to form one piece. The three types are as follows: Pillar bolted connecting straps containing brass nut in post to be used for bolted connections. This form of connector may be removed without drilling or cutting and replaced without burning. Pillar burned connecting straps with solid lead post to be used with burned top connectors. This form of connector strap may be removed by drilling a $\frac{1}{2}$ inch hole where the pillar strap connector is burned to the pillar post and the strap connector can then be lifted off. L straps which are burned strap to strap in adjacent cells, thus requiring no extra top connector. This type of strap is sawed just above the line between the adjacent jars in removing. The two last forms of connectors must be burned on in replacing.

After the straps are removed the covers are taken off. They are sealed to the jars either by sealing compound, which may be removed by means of a hot putty knife, or by soft rubber sealing gaskets. In replacing covers it is essential that the sealing compound or gaskets be replaced as originally found.

When the covers are taken off lift the elements from the cell and carefully separate the positive from the negative plates. Rinse the elements by dipping them in distilled water. Wash out the jars after the old electrolyte has been removed.

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It will probably be necessary to replace the wood separators. It is a good rule to follow to use new wood separators whenever a battery is cleaned. If the rubber separators are damaged or cracked they should be replaced by new.

In replacing the separators care should be observed that they are about $\frac{1}{2}$ inch above the elements. When in place in the cell they should reach the bottom or bridge of the cell.

After the elements are thoroughly cleaned they should be put back into the cell, which should be filled with new electrolyte of the same density as the old. Note this important fact concerning the electrolyte. The covers are next put back, resealed and the connectors burned back or bolted.

The electrolyte should cover the separators about $\frac{1}{2}$ inch. The battery should then be put on charge at about 75 per cent. of the finishing rate and left on till the cells are thoroughly charged as indicated by no further rise in gravity, maximum voltage and free gasing. It will probably be necessary to go over the battery at this time and adjust the gravity of each cell to 1.300 by the addition of 1.300 electrolyte as required. The proportion of acid to water is about one to three.

In mixing acid and water the acid should always be added slowly to the water, stirring it constantly. Always use distilled water and mix in glass, porcelain or lead containers. Do not put the mixture into the cell until the temperature falls to normal.

It is essential that all connections are burned together as originally found. This in itself is a big proposition for an inexperienced man. It is essential that the battery be charged immediately upon its reassembly. Unless you have the facilities for doing this you will be obliged to take it to a battery station. The cost of overhauling the battery entirely by such a station is not excessive. We should advise you to have it done by an expert man, experienced in such work.

TROUBLED WITH SQUEAKING BRAKES.

(W. H. L., Easton, Penn.)

I am having quite a little trouble with the brakes on my car. I put different kinds of oil on the bands, which seems to help for only a short time, then they begin to squeak again. How can I stop the noise?

Remove the brake bands and clean well with gasoline so as to remove all the hardened grease and dirt. If they show signs of excessive wear, or the reinforcing brass wire shows on the surface, it will be practical to renew the linings. This is important: Do not put back badly worn linings. Such a proceeding may cost you your life. The brakes are the most important part of the car and should be kept always in the best of condition. If the linings, however, seem to be all right, replace the bands. Adjust them so that, with the brake pedal thrown off, there is about $\frac{1}{32}$ inch opening all the way around between the brake band and the drum. This opening should be regular, by that we mean that the contour of the brake band should be the same as that of the drum. If it is not, when the brakes are applied, pressure is brought to bear only upon one or two points, rather than evenly all around. This may be your trouble.

To be sure that the contact is evenly distributed you may try the following experiment. Chalk the brake drum on the friction surfaces with crayon and put it into place. Set the brakes slightly and turn the wheel around two or three times and remove it. Note whether or not the brake bands have been evenly covered with chalk at all points. If they have not, then it is an indication that the friction is not evenly distributed. You may find that it is necessary to put in new or longer lugs in order to distribute the wear more evenly. If the chalk experiment is not satisfactory you had better see a repair man. Do not neglect such an important detail. We would not advise the use of oil upon asbestos fiber. This material should be self-lubricating and require no oil.

Before putting on the wheels, lubricate the brake expanders, supports, rods and rockshafts; in fact, all points except the braking surfaces. Be sure that the brake springs are strong enough to hold the bands from the drums at all times except when the brakes are set.

With the brake bands properly adjusted, the action should be gradual. Beginning at the least touch of the brake

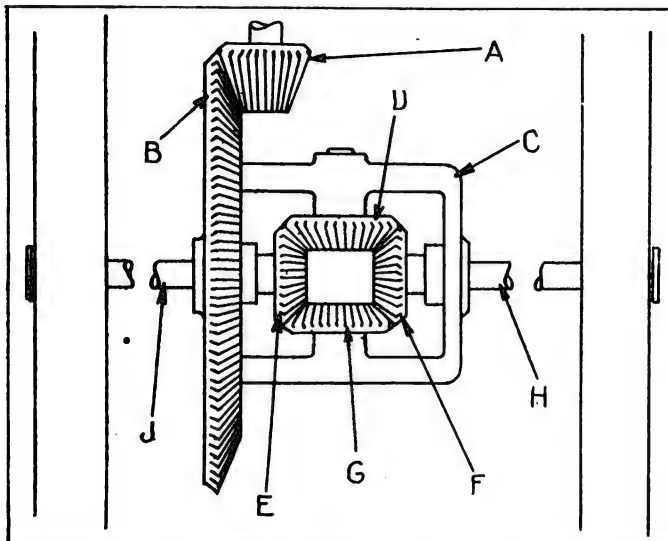
handle a gradually increasing pressure being brought to bear on the drums until they are locked. Do not have the adjustment so set as to cause such harsh or gripping action. Such an action causes the wheels to stop before the car does, a consequent wear on the tires, to say nothing of the damage to other parts of the car. Though the action of the brakes should be smooth and gradual, it should be positive.

DIFFERENTIAL ACTION EXPLAINED.

(A. E. S., York, Penn.)

I have just purchased a new car and it is full of mysteries to me. One thing in particular which seems very strange is the action of the rear wheels. When one of them is jacked up I can turn the engine over with the clutch in and the free wheel will turn, but the other does not seem to push the car forward at all. If I jack both of the wheels up and turn on one, the other will turn in the opposite direction. Will you please explain the reason for this to me?

This action, due to what is called the differential and which is located, usually in the rear axle, in the large part of the rear axle housing about at the centre, is very necessary for turning corners or even running along on comparatively straight roads. To illustrate, consider, for instance, a car which is turned in a complete circle of 10 feet. If both wheels were left free to turn in the same manner that the front wheels of a car are, then the inside wheel would traverse the circumference of a 10 foot circle, a distance of



Illustrating Differential Gearset.

about 31½ feet. The outside wheel, however, would traverse a distance of 46 feet. In other words, the outside wheel would make nearly two more turns than the inside wheel. Now if the drive to both rear wheels from the engine was positive, and both wheels were forced to turn the same number of revolutions, the outside wheel would be dragged rather than rotated some of the distance. To overcome this tendency the differential action was designed. Upon referring to the illustration, A represents the driving pinion which rotates with the engine when the clutch is engaged. B is the master gear, upon which is fastened the differential housing C, and which carries two or more small pinions, U and G, which mesh with the axle gears E and F. Let us suppose that the wheel which is fastened to the axle H is jacked up, free to rotate. The gear A is turned, the power is transmitted through the gear B to the differential housing C. As this housing revolves the gears D and G are carried around with it, and as gear E is held stationary they revolve, and the gear F and the shaft H are turned in the same direction as the master gear B. It will thus be seen that the power will be transmitted to the wheel offering the least resistance to rotation.

Let us assume that both wheels are jacked up and the wheel which is fastened to H revolved. The motion is transmitted through the gear F to D, which rotates, and E is turned in the opposite direction to F, then the other wheel is turned in an opposite direction to that of H.

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Carbon, the greatest detriment to engine efficiency, may be minimized by the proper choice of lubricants. For instance—


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So long as there is a drive through the gear B, then there must be rotation in either E or F.

ELUSIVE KNOCK IN ENGINE. (H. S., Ridgefield Park, N. J.)

I have a Ford car, model T, 1914, that has an elusive knock in the engine. I have had the engine entirely overhauled, crankshaft bearings have been tightened, oversize pistons (.0025), have tightened all four connecting rod bearings, put in a new centre camshaft bearing, all pins are tight and have proper fit, rings are tight in grooves in pistons, all valves are adjusted to about .001. Valve tappets are not worn so as to have too much play in the guides. The knock which sounds very much like a valve tap is noticeable when the engine is running idle, and also when pulling up a slight grade or on a level above 25 miles per hour. Or when running down grade with clutch in. The noise seems to be between number two and three cylinders. The spark timing is correctly set. Will you please tell me how to locate it?

You seem to have carefully covered about all of the common causes of engine knock, and so we will not discuss these reasons, which we assume you have carefully considered. We will, however, call your attention to one fact which you might have overlooked, the matter of loose bearings. By this we mean especially a loose babbit in the bearing, either on the crankshaft or connecting rod. Although the bearing may be tight on the shaft, if the babbit is not tight in its container it may knock.

You do not seem to have considered the possibility of a loose flywheel. This may cause a knock, usually heavier than the one you complain of, however such a case might be possible. Have you carefully inspected the valve guide bushings, both in relation to the valve stems and to the engine block? The bushings may fit the valve stems perfectly, but be loose in the engine block. The same thing may apply to the tappet guides.

Another thing which may be possible is that the cams on the camshaft may be out of shape to a certain extent. There might be a slight nick or projection upon one of the cams, which will cause a click when it comes into contact with the tappet. Are you using any sort of valve stem or tappet adjusting device, such as a cap? If so, see that the fit is absolutely tight.

Carefully examine the valve springs and see that the coils do not compress completely together; in other words, see that the springs are not too big or long for the valves.

Occasionally it happens that the timing gears work loose on the shaft; such a case is very possible, as the keys are short. There should be no play between the gears and the shafts.

Are you sure that the trouble is in the engine? A knock in the transmission gearset may seem to come from the engine. The disc carrier may not be tightly keyed to the shaft. If it is possible for you to try the engine without the transmission gearset you can easily locate the trouble as being either in the engine or transmission.

HAS TROUBLE WITH ENGINE. (H. R. S., Smyrna, N. Y.)

I have a model 83-B — car, and am having trouble with the engine. When it is throttled down to or below 10 miles per hour the engine skips. Would it be advisable for me to install a new carburetor with a shorter intake manifold? This car is equipped with a Dixie magneto and a Tillotson carburetor.

There are a number of causes, any or all of which may result in the trouble which you mention, namely, the skip in the engine.

It would be well for you to examine the magneto breaker box points and see if the adjustment is correct. Turn the engine over until the platinum points snap apart, this distance should not be more than .020 or 1/50 of an inch. When this part of the machine is adjusted set the spark plug points about .025 of an inch apart.

The next possible cause of trouble is in the carburetor

mounting, a long manifold such as you have, may cause a condensation of fuel upon the sides and result in improper mixture at low speeds. As the engine is speeded up this trouble will probably disappear. The remedy for this is to put on a shorter manifold, which may necessitate a change of carburetors and a fuel feed system. Such a step should not be resorted to unless the trouble is positively located as being in the fuel system.

Leaks in the manifold, in the manifold gaskets, in the valve guides, or in the tappet adjustment, will cause a skip in the engine at low speeds. Carefully examine all valve guides and be sure that they fit the valve stems. Adjust the tappets or valves so that the clearance between them is not over .012 when the engine is hot.

TAKING UP LOST MOTION IN STEERING GEAR. (C. A. B., New Cumberland, W. Va.)

I have a Gemmer irreversible worm and sector type steering gear in which there is lost motion in the pitman arm. How can I take up this lost motion? The hood of the car rattles a great deal on rough roads. I have put new lining on the sill, but get no results. Would it help to put on an extra fastener about the middle of the hood?

The lost motion of which you write is very probably due to the fact that the worm on the steering shaft is not held tightly enough between the two ball thrust bearings in the housing. You will find this adjustment on the steering housing just above the worm wheel housing. There may be one on the bottom also. By screwing this up the worm will be held tightly between the two bearings. To prove, open the grease hole cover and see if the worm slips up and down on the shaft as the pitman arm is moved from side to side.

If this is not the trouble, then it is possible that the pitman arm key is worn, or the keyways in either the worm wheel or pitman arm are too large. As the worm is keyed to the steering shaft there may be trouble at this point also.

We would suggest that you replace the present hood fasteners with spring fasteners, or if the car is equipped with spring fasteners, increase the spring tension. Your suggestion of putting another set of fasteners about the middle of the hood is good. Though this should be unnecessary if spring fasteners are used on the ends.

WANTS TO KNOW ABOUT STORAGE BATTERY. (B. M. B., Port Jervis, N. Y.)

Will you please let me know whether I can replace a — three-cell, 80 ampere-hour battery with a battery of any other make on a Studebaker 1915 car? The one I have is nearly two years old and only tests about 1200 when charged. Would it be advisable to add acid to bring up the specific gravity? Will it do any harm to use it as long as it starts the motor regardless of the low test?

What style of tires shall I order for this car, clincher or straight edge for the demountable rims?

If the specific gravity of the electrolyte in your storage battery is only 1200, it is 100 points below normal. It is an indication that the sulphuric acid content is low. Do not attempt to replace it yourself. Have it done by a battery repair man, or battery expert, immediately. Delay or use of the battery as it is at present will result in permanent damage.

It will be all right for you to replace the battery in the meantime with another of equal voltage (the same number of cells). It will be most practical for you to replace with a battery of the same ampere-hour capacity, though this is not arbitrary. The voltage or number of cells must be the same in every case.

Whether clincher or straight edge tires may be used on the demountable rim depends upon the type of rim which you have. As far as actual service is concerned, one kind is as good as the other. We would suggest that you replace the tires with the same type that have been used in the past and as the car is now equipped.

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Beware of Cheap Greases !

In cold weather greases harden; in warm weather they melt and leak out; in *neither case* do they properly protect the parts from wear.



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COMING EVENTS

AUTOMOBILE RACES.

Uniontown, Penn., Speedway.....	May 10
New York, Sheepshead Bay, Speedway, Metropolitan.....	May 19
Walla Walla, Wash., Track.....	May 20
Uniontown, Penn., Speedway.....	May 30
Chicago, Ill., Championship, Speedway.....	June 9
Kansas City, Mo., Speedway.....	June 16
Cincinnati, O., Speedway.....	June 23
Omaha, Neb., Championship, Speedway.....	July 4
Spokane, Wash., Track.....	July 4
Tacoma, Wash., Speedway.....	July 4
Uniontown, Penn., Speedway.....	July 4
Visalia, Cal., Road Race.....	July 4
Benton Harbor, Mich., Track.....	July 4
Des Moines, Ia., Speedway, Championship.....	July 14
Missoula, Mont., Track.....	July 15
Buffalo, N. Y., Interclty. Road.....	July 17-19
Anacosta, Mont., Track.....	July 22
Tacoma, Wash., Championship, Speedway.....	July 23
Great Falls, Mont., Track.....	July 29
Kansas City, Mo., Speedway (dirt) Aug. 4	
Billings, Mont., Track.....	Aug. 5
Elgin, Ill., Road Race.....	Aug. 18
Spokane, Wash., Interstate Fair.....	Sept. 2-9
Cincinnati, O., Championship, Speedway.....	Sept. 3

Red Bank, N. J., Track.....	Sept. 6
Pikes Peak, Col., Road Climb.....	Sept. 8
Milwaukee, Wis., at State Fair Park.....	Sept. 9-15
Providence, R. I., Championship, Speedway.....	Sept. 15
Allentown, Penn., Track.....	Sept. 22
Trenton, N. J., Track.....	Sept. 28
New York, Sheepshead Bay Speedway, Championship.....	Sept. 29
Uniontown, Penn., Speedway.....	Sept. 30
Kansas City, Mo., Speedway.....	Oct. 6
Uniontown, Penn., Speedway.....	Oct. 6
Danbury, Conn., Track.....	Oct. 6
Chicago, Ill., Speedway, Championship.....	Oct. 13
Richmond, Va., Track.....	Oct. 13
New York, Sheepshead Bay Speedway.....	Oct. 27

SHOWS AND CONVENTIONS.

Atlantic City, N. J., Show, management S. W. McGill.....	March 31-April 14
National Association Automobile Accessory Jobbers, Convention, Summer meeting, at Homstead Hotel, Hot Springs, Va.....	June 4-6
Milwaukee, Wis., first annual used car show.....	April 20-26

"SOCIETY OF AUTOMOTIVE ENGINEERS" AFTER APRIL 19.

"Society of Automotive Engineers" will be the official name of the body of engineers allied in the various organizations that were brought together under one head during the past year as the Society of Automobile Engineers, after April 19. The society in its present status represents the automobile engineers, aeronautical engineers, tractor engineers and members of the National Association of Engine and Boat Manufacturers.

When the programme for the summer meeting of the S. A. E., which was recalled for revision with respect to the rise of war conditions, has been completed the society will announce the time and place of holding it.

NEW FISK BUILDING 600x105 FEET.

In a story about the new building of the Fisk Rubber Co. at Chicopee Falls, Mass., printed in The Automobile Journal, Feb. 10, it was stated that the structure was six stories in height and 60x105 feet. This was a typographical error, the dimensions of the building being 600x105 feet.

MAHIN ADVERTISING CO. NOW WM. M. RANKIN CO.

The Mahin Advertising Co., Chicago, Ill., has changed its name to the William M. Rankin Co.

E. A. GILMORE, PIONEER AUTO DEALER, DEAD.

Ernest A. Gilmore, a pioneer automobile dealer in Boston, Mass., died at his home in New Rochelle, N. Y., on April 4, following a brief illness. He first en-



E. A. Gilmore.

tered business life in Philadelphia, where he engaged in the bicycle business as manager for the Jeffery company. About 15 years ago he went to Boston as manager of the Thomas B. Jeffery company, selling Rambler cars. With J. H. Mac-

Alman and George H. Lowe he managed the first automobile show ever held in Boston. He was at one time president of the Bay State Automobile Association and a director of the Boston Automobile Dealers' Association. Two years ago he became New York manager of the Carl H. Page Co., handling Mitchell cars.

After leaving the Jeffery branch in Boston he formed a partnership with Charles Whitten of Lynn under the name of the Whitten-Gilmore Co. of Boston, handling Chalmers and Hudson cars. Later he started the firm of E. A. Gilmore & Co., and sold the Lewis and Allen cars.

RECORD REGISTRATION IN MASSACHUSETTS.

The registration of automobiles in Massachusetts during the first three months of the present year totaled 95,798, as compared with 64,835 in the corresponding period in 1916, an increase of nearly 50 per cent. The registration in 1916 during the same period as compared with 1915, showed an increase of but 10 per cent. The state has received nearly \$1,000,000, or almost as much as was received from the entire registrations last year.

The following table shows the registration statistics for the three-months period this year as compared with last year:

	1917	1916
Automobiles	95,798	64,835
Motorcycles	3,393	2,310
Manufacturers or dealers	2,055	1,625
Licenses operating chauffeur	10,042	6,002
Operators and chauffeurs renewals	22,024	18,858
Examinations	3,104	1,900
Total receipts....	\$1,058,674.14	\$745,468.49

There were 17,359 commercial vehicles included in the registrations so far this year as compared with 10,860 during the same period last year.

THE DIXIE OVERLAND HIGHWAY ASSN. INCORPORATED.

The Dixie Overland Highway Association has been incorporated under the laws of the State of Georgia, with headquarters at Columbus, Ga. The association will foster the construction of a highway from Savannah, Ga., to Los Angeles, Cal., through eight states and 74 counties.

ON INDUSTRIAL PROBLEM BOARD.

Two representatives of the National Automobile Chamber of Commerce on the National Industrial Conference Board have been named, Charles Clifton, president of the N. A. C. C. and president of the Pierce-Arrow Motor Car Co., and John N. Willys, president of the Willys-Overland Co. of Toledo.

Said Mrs. Ryder—

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Be good to yourself, to your family, to those who ride with you—Hartford-equip and make your car a better riding car. Over 400,000 car owners have done just this.

Less jolt and jar mean lower upkeep, fewer tire renewals, a long-lived car—and best of all—comfort over every road.

"Between You and Jolt, Jar and Vibration" is a booklet of intense interest to every car owner. Sent on request.

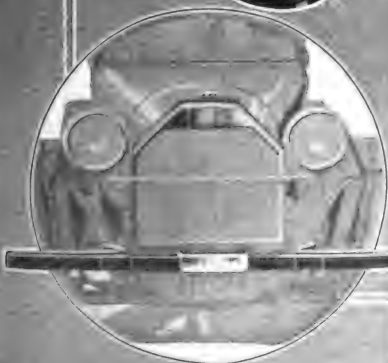
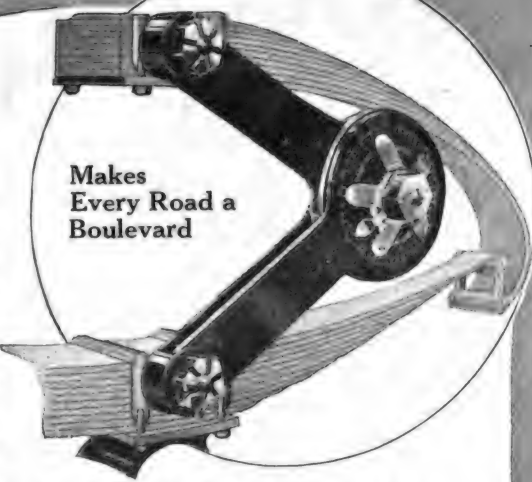
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The Giant Searchlight is found on most all high priced cars, despite its moderate price, and is equally serviceable on cars of all classes.

The lamp shell is black enamelled steel and the reflector is nicked brass silver plated. The lamps are Mazda C (gas filled).

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GETTING FOREIGN BUSINESS

THERE are today a large number of American manufacturers of motor vehicles who are doing a most satisfactory business in foreign countries. Even as conditions are today, these keen, farsighted, opportunity grasping, progressive concerns are rapidly perfecting selling channels which will permit them to dispose of a very considerable part of their output.

American products are already established in all foreign countries as standard goods, the best that can be produced. Thousands of foreign trade distributors are specializing in lines that are produced in this country. These are concerns that are well established. They are in a position to transact a large volume of business. This means certainly and distinctly that they can afford service to the buyers in their home field which will compare favorably with the service which domestic distributors supply to their patrons in this country.

Generally speaking, such connections in a foreign country are cash buyers, and, as they are now looking to America as the logical country to supply their needs, it is the opportune time for the producers in this country to explore foreign fields and reach all of the dealers who are in a position to place orders.

TRADE POSSIBILITIES UNLIMITED

The market of the world will soon be open to American manufacturers. It is waiting for American products. It is waiting for American service. There should not be an instant of hesitation. There is nothing mysterious in the act or details of entering into foreign business. The opportunities are unlimited. It is certainly the foresighted manufacturer who is now busily engaged in establishing his lines in the foreign field. Most emphatically he is establishing them on a permanent basis, almost as soon as he has made a beginning.

The way to enter foreign trade is simple. Not as an auxiliary, but as a direct channel, the Foreign Trade Bureau of the Automobile Journal opens the markets of the world to manufacturers. This bureau now enjoys a large membership, including concerns that produce vehicles, parts and equipment. Those who are affiliated with the Automobile Journal Foreign Trade Bureau are in direct touch with more than 8000 foreign dealers, in more than 85 foreign countries. Membership in this bureau is free to advertisers in the Automobile Journal. The great advantage afforded is that all members operate their own foreign departments, yet at practically no additional overhead.

REACH ALL BIG TRADE INTERESTS

The concerns and individuals reached by the members in this bureau are the leading distributors in their respective countries. Most of them are what we would term importing jobbers, as they buy to sell again and to place lines with dealers who do not import products. This affords the members of the bureau the distinct opportunity to reap golden benefits through the zealous selling efforts of thousands of small dealers whom they could not reach in any other way than through this bureau.

The service is simple, complete and efficient. Besides constantly increasing in its worth to members, it supplies an immediate asset to any manufacturer of great value. It possesses result-producing factors that makes it a big feature in connection with any business that uses it.

The bureau is conducted under the personal direction of T. Wesley Wright, with offices in New York City. His services are free to members. Mr. Wright is without question one of the best informed export men in America. He has developed this bureau to a degree of efficiency that makes it a business proposition of magnitude, wholly serviceable, worthy of the utmost confidence, and that will bring a magnificent reward to those who utilize it. The American manufacturer must realize that a foreign department is the best promotion feature of the day and hour. The time to develop the foreign field is now.



All Commercial Records Broken

The adoption as standard equipment of AC Spark Plugs by the following makers of quality cars, constitutes a record which no spark plug has ever approached. All had the same chance—the manufacturers play no favorites. Merit alone won for AC in open competition.

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Chandler	Jordan	Netco Truck
Haynes	Liberty	Sandow Truck
Chevrolet	Crane-Simplex	Signal Truck
Dort	Phianna	Brookway
Cole	Westcott	Truck
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Paige	Peterson	Gramm-Bernstein Truck
Peerless	Detroit	Moreland
Pilot	Davis	Truck
Abbott	Lexington	Wilcox Truck
Pathfinder	Howard	Sterling Truck
White	Daniels	Republic Truck
Delco-Light	Murray	Diamond T
Saxon	Bow-Davis	Truck
Stutz	Scripps-Booth	Four Wheel
National	Monroe	Drive
Vellie	Singer	Lincoln Truck
Jackson	Stephens	Samson
Apperson	Dodge Bros.	Tractor
Anderson	McLaughlin	Acme Truck
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1819 miles in 24 hours at Sheepshead Bay. (The previous record made by a racing car was 1581 miles.)

Dash from Pacific to Atlantic in 5 days, 3 hours and 31 minutes—starting back the same day. Return trip made in 5 days, 17 hours, 32 minutes.

Non-stop road record by Patterson in Grand Prix using same set of AC plugs in both Vanderbilt and Grand Prix.

Buick Light Six broke Los Angeles, San Francisco record with average speed of 43 miles per hour.

Cadillac Eight Coast to Coast, 7 days, 11 hours, 52 min. Previous record held by Stutz AC equipped.

Marmon, Coast to Coast dash, 5 days, 11 hours, 30 min.

Nearly all cars in Giants Despair Hill Climb were AC equipped. Such coming cars as Maxwell, Mercer and Pathfinder used AC's in this climb. They are not regularly equipped with AC's.

The success of AC Plugs in the past is due to the fact that every change and improvement is made along sound engineering lines and in 1917 their superiority over other makes will be even greater than in past years. This evidence should make you use AC plugs on your car, if it is not equipped already with them. On sale everywhere.

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Entered as second class matter, April 15, 1906, at the Postoffice at Pawtucket, R. I., under act of Congress of March 3, 1879.

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a Copy

VOL. XLIII.

APRIL 25, 1917.

NO. 6.

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Treasurer . . . WILLIAM H. BLACK

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Published the 10th and 25th of each month by the

AUTOMOBILE JOURNAL PUB. CO.

Times Building, Pawtucket, R. I.

AS HAS been the custom for several years, it is the intention to collect in one issue of the Automobile Journal a great volume of data for the information and benefit of motorists concerning the best routes for motor tours. This number, which has become known as the Annual Touring Number, will be issued June 10. The articles which will be included are national in scope and profusely illustrated. Accurate itineraries are given with each tour and a general index, which enables the reader to lay out a tour in the part of the country he or she most desires. This number will be one of the most important and most valuable of the year.

WITH this issue the magazine begins the publication of a number of studies on garages and garage service, a subject in which all motorists are deeply concerned. Besides publishing the first of a series of plans prepared by its Architectural Department, there is also given a description of the largest, new service station in New England, fully illustrated as to plan, display and card system. The May issues will contain additional garage plans and studies, as well as other important features.

AS FOR the current issue, it is seldom such a wealth and variety of information is gathered within the covers of a single magazine. A series of timely articles on car utility culminates in this issue with profound analytical attention to the part tractors and tractor cultivation play in the world's food supply. Valuable legal and touring information is contained in the National Automobile Association Journal section, and an exceptional profusion of practical hints and helps for motorists is accessible in the several departmental pages. Car descriptions and replies to queries are most interesting.

"GETTING down to brass tacks, facts and figures," as the Association of National Advertisers, Inc., phrases their opinion, "a triumph of economical marketing" is found in the medium of general advertising, and that, contrary to the general belief, publicity is an economic necessity rather than an economic waste. This association, which is composed of a large number of the biggest advertisers in the country, in a recent compilation, published several striking instances of a half dozen famous products and commodities in proof of their assertion. Camera, hat, food, shaving soap and automobile manufacturers are mentioned where great publicity campaigns have resulted in such an increase in the output that manufacturing costs have been lowered from 25 to 75 per cent. The case of the automobile is mentioned as the most conspicuous example of all, a comparison being made with the \$5000 to \$10,000 automobile of years ago, with the automobile of today which sells for a small fraction of those amounts.

ADVERTISING has created the demand for these things on such a large scale that production and distribution has been necessarily on a large scale, with the result that manufacturing efficiency has been increased and selling costs lowered. All of this has been going on steadily as the result of advertising, despite the constant increase in the cost of labor and raw materials which, with advertising eliminated, might in many cases have doubled the price of the goods.

BOTH to save time and guard against the non-receipt of issues of the magazine, subscribers when giving notice of a change in location should always supply the old as well as the new address.

UNIVERSAL TRUCK ACCOUNTING SYSTEM

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THE MOTOR TRUCK
Times Building Pawtucket, R. I.



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NO SAND TOO DEEP

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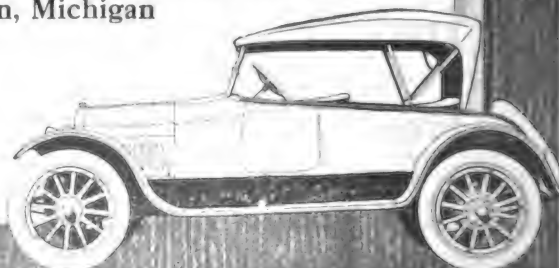
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Jackson Automobile Company

1207 East Main Street, Jackson, Michigan



The AUTOMOBILE JOURNAL

VOL. LXIII. 43
APRIL 25, 1917.
NO. 6.



Ford Runabout as a Tractor, Does Work Equal to Four Horses on a Long Island, N. Y., Farm.

The government of the United States and the governments of the several states * * * will do everything possible to assist farmers in securing adequate supply of seed, an adequate force of laborers when they are most needed, at harvest time, and the means of expediting shipments of fertilizers and farm machinery, as well as of the crops themselves when harvested. The course of trade shall be as unhampered as it is possible to make it, and there shall be no unwarranted manipulation of the nation's food supply by those who handle it on its way to the consumer. This is our opportunity to demonstrate the efficiency of a great democracy, and we shall not fall short of it.

President Wilson.

SALUTE—The Automobile of the Furrow!

**Tractor Cultivation the Saving Factor That Will Provide Food
For All Mankind While Practically All the World Wages War**

AMONG experts in food production it has been known for a long time that tractor farming in the United States means amazingly more than the mere substitution of motor power for animal power. On American scientific farming, this year, with little or no question, rests the burden of feeding the world. The United States has thrown the power of its vast economic resources into the scales of war. This far-flung conflict is the greatest war in the history of the world, and as it will just as certainly be the most exacting war in which the people of this government have ever engaged, the problem of food supply has already taken precedence over gun power and munitions.

In this situation the motorist, a factor of more than 4,000,000 strength in cars owned and in use, is intensely concerned. As being both a producer and consumer he has a dual interest in the matter of food production.

As being a mobile factor in the general economy, he has exceptional opportunities for fitting into the scheme of food-stuff production by action as well as by consultation.

With food the big question at the outset of the war, the natural bent of the motorist, in common with the rest of his countrymen, is to affiliate with, support and advance, in every way and manner possible, well laid plans for the conservation of agricultural resources, and help in securing, from one end of the land to the other, a more intensified agriculture. Single, isolated effort, no matter how well meaning, will not be the true measure of duty before the average motorist. Co-operative effort and united action, together with the use of the latest improved farm machinery, are required everywhere in the interest of obtaining an adequate crop to meet the needs of the Allies in this war—France, Great Britain, Italy, Russia—as well as to supply food for



Tractor Pressing Heels of the Original Horseless Plow.



Three Operations, Plowing, Discing and Harrowing, at the Same Time.

the population of the United States and Canada.

It is all well enough for each individual to plan, plant and cultivate a garden this spring. Prudence says without stint, let the good work go on. It is, nevertheless, true that a far better plan is to collect this sporadic energy and mass it in a way that will bring the greater crop results. Affording an excellent chance for real service by the motorist with a pleasure car, it would be excellent economy, superior efficiency and highly practical to mobilize all the man power which will have time to give to cultivation and offer it to established gardeners and farmers. Labor on the farms will be one of its greatest problems, as it has been for years past. In these days of shorter work hours and daylight saving movements, regular clubs might well be formed and schedule made for the transport of workers to the fields surrounding cities and towns. The speedy pleasure car will furnish the means of transport, carrying persons to and from the fields where they work, under the direction of scientific farmers and gardeners, would count most heavily in the food problem.

The food situation in this country is the saddest of all commentaries on the matter of preparedness for war in the age of the tractor—the automobile of the furrow and the road giant for market haulage. According to statistics compiled by the government, only 20 per cent. of the tillable soil of the country is being tilled. Going to war with so many vacant fields behind us might prove us a handicap and a hindrance to our allies if we attempt to put large numbers of soldiers in the field and feed them. It is all very well to cultivate the vacant lots; but that is like saving at the spigot and wasting at the bung, if the vacant and neglected farms are left fallow. Motorists have a big opportunity to help governmental agencies in organizing and hauling to the fallow fields man power to put in crops and to harvest them when they have grown and ripened.

Statistics of the Department of Labor show that men who earned \$3 a day in 1907, working 10 hours, draw \$3.48 daily now, working nine hours and 36 minutes. If that were all what an optimistic out-

look workmen today would have. It is no small progress in the era where the tractor and the machine have revolutionized hand methods of farming and mechanical production, to reduce working hours appreciably and increase wages half a dollar a day in so short a period. That \$3 in 1907, though, would go as far then as \$4.17 now. This, again, is according to statistics from the Department of Labor. Actually, then, these men are worse off by 69 cents daily than they were 10 years ago, owing to the high cost of living. Intensified farming, with tractors, and volunteer help, transported between times to the land and back to the lathe again, may be the thing, introduced by war conditions, which will prove once and for all to the mechanic and city dweller that the high cost of living may stalk abroad in the cities, but it has no standing in the country; the farmer is never out of work and hunting a job.

The cost of living is consistently rising. During the month before Feb. 15 reports the April number of the Monthly Review of the Bureau of Labor Statistics of the U. S. Department of Labor, the combined price of 27 principal foods went up four per cent. Onions led with 77 per cent. jump. Potatoes went 30 per cent. Five articles—flour, rice, raisins, coffee and tea, were stationary, and eggs

was the only food that decreased in price.

In 1913 the average family food bill within the United States was found to be \$339.30. Like quantities of the same foods in February footed up \$425.54. The greatest element of increase is in potatoes, from \$18.96 to \$44.69 for 882 pounds. Other heavy increases are in eggs, 85 dozen at \$43.07 from \$33.01; flour, 454 pounds at \$25.40 instead of \$15.12, and butter, 117 pounds at \$54.78 in place of \$45.72. Of the whole list of foods, sirloin and round steak only were cheaper in February, 1917, than in 1913.

The greatest encouragement to be found now and in the future is that increased production can be promised on the farms of the United States by increased man power and implements. The acre yield in America under the ordinary systems of agriculture is low, but the man yield is high. In European and Asiatic countries under systems of intensive farming the acre yield is high, but the man yield is low. For example, the acre yield of wheat in America is little more than 14 bushels, while in Germany it is 31 bushels, in France almost 30 bushels and in Japan 24 bushels. But the yearly income for each farm family in America is approximately \$1000, as compared with \$580 in Germany, \$570 in France and \$235 in Japan, according to Waters.

Today each person in the United States consumes, on an average, between five and six bushels of wheat each year. Each family consumes an average of half a ton of meat a year. In the tractor age of farming fewer people are needed on the farm to produce a living for the world than formerly. A century ago more than nine-tenths of the people of the United States lived on farms and were directly dependent on agriculture for a living. In 1910 about one-third of the people were engaged in agricultural occupations. Formerly a farm supported a family and produced a small surplus to supply the needs of the few people who lived in towns and cities. Today the farms are required to fill both domestic and export needs—and now with war everywhere the demands are increased by the thousand



Working a Field of Stubble with a Gang of Four Disc Plows.

fold. The domestic needs alone, according to the authority quoted above, requires each farm to support three families—the one that lives on the farm and tills its fields and two that are living in town. Under present conditions, as nearly as actual investigations will show, each farm will soon be asked to support three families in town.

When these conditions are faced in their entirety it is readily seen that the automobile of the field and furrow has come to stay, just the same as did the automobile of the city street and highways everywhere. In some parts of the country the field variety has its work cut out for it on a large scale. In small farm districts, as on the eastern seaboard, automotive farm machinery is applicable more on the share, or co-operative principle. In these sections particularly, and anywhere that the need arises to transport men to or from the fields, in seed time or harvest, to the plow and serve the reaper, the average motorist has an immediate "bit" to do. It would not be surprising to have commanders lay hands on the automobile of the highway and steer it directly into the fields, where numerous services of the power wagon await many an ingenious application. Necessity has always been known as the mother of invention. In the age of the tractor the problem of feeding the world is far less complex than it was in the age of hand power only.

That the great public is awake to this immense economic question there is no doubt. Early in April a farm tractor school was held in New York City, the metropolis, which for decades paid so scant attention to farms. On top of this Mrs. W. K. Vanderbilt, Jr., made a gift of three farm tractors to the Long Island Food Reserve Battalion, and these are already at work, as the press reports it, "turning virgin soil."

The situation has brought the farm tractor—an offspring of the automobile—to international importance. The present demand for increased yield from our farms means, perhaps, a government de-



Caterpillar Type Apron Tractor Works Soft Muck Land Where Round Wheel Machines Could Not Work.

mand for greatly increased tractor production. Of course the furnishing of agricultural machinery rests with the productive industrial forces of the nation. It is not meet here to consider so much how tractors will be made or where. The government, through its spokesman, President Wilson, has pledged the country that the necessary mechanical equipment will be provided. This means that factories will be kept running to supply agricultural machinery. It means that the vast army of mechanics shall be kept employed, so far as the necessary recruitment for the army and navy will allow, at their every day useful labor. It means not only in one line, but in practically all lines of work the duty of the day is to stick to the every day task until the good right eye and arm and hand is called to its country's service elsewhere. It means to guard against hysteria, just as Howard E. Coffin of the Advisory Commission of the Council of National Defense, has found it necessary to advise in a statement to the country at large, including the automobile industry and the automobile owner, no matter what his place in life or occupation. This means it is no time to become "tight;" it is no time to hoard, neither

money, nor labor, nor food. As far as possible let activities be normal—work—spend normally—co-operate.

The farm tractor is by no means a new arrival in the field of cultivation in the United States. It has been doing service a number of seasons, yet it is not surprising in this day and age that a people who have already been through a series of food panics in the last half dozen years should turn to this mechanical invention as the one savior in a time that looms large with the prospect of food scarcity. This is the mechanical age. The man with the hoe rides a sulky, instead of breaking his back in the fashion shown by Millet's famous canvas, the inspiration of Markham's great poem on the same theme. Today, too, he rides a motor power sulky, instead of an animal power contrivance. The tractor has come as an evolution in agriculture.

The government, about 1810, opened 2,000,000 acres of land. The great bulk of the nation's population turned their faces westward to conquer the great forests with the axe, but still using the wooden plow, the sickle, flail and other "starvation" tools. With such tools one man could scarcely produce enough for more than his own family. Horse propelled machinery naturally suggested itself, and, with this power in the furrow, the nation subsisted, after a fashion, for many years.

How did all this great early progress in farming work out? In 1845 the people of the United States did not raise enough wheat for their bread. At that time the production was only 4.33 bushels for each person. In 1859 the production had been increased to 5.6 bushels per capita, in 1869 to 7.5, and in 1879 to 9.2 bushels. In 1830 it required three hours of a man's labor to produce a bushel of wheat; in 1896 it only required 10 minutes. In 1850 the labor represented in a bushel of corn was 4½ hours; by 1894 this had been reduced to 41 minutes. In 1860 the labor represented in a ton of hay was 35½ hours; in 1894 the labor cost of a ton of hay had been reduced to 11½ hours.

This, however, is the age of the tractor. It is the automobile of the furrow. It has brought efficiency in the handling of the soil for food production. The tractor is an absolute economic necessity in



Gang of Two Disc Plows Can Be Used on Small Farms.

the West. Although conditions in prairie states make better for the use of tractors on a large scale, a tractor census taken by the government discloses a widespread distribution. This census shows that there are in the 48 states 34,371 tractors. The compilation is as follows:

Alabama	313	Nevada	19
Arizona	23	New Hampshire ..	23
Arkansas	336	New Jersey.....	107
California	1358	New Mexico.....	83
Colorado	525	New York.....	1210
Connecticut ..	47	North Carolina ..	452
Delaware	34	North Dakota ..	2137
Florida	71	Ohio	1305
Georgia	543	Oklahoma	795
Idaho	262	Oregon	318
Illinois	3202	Pennsylvania.....	595
Indiana	1852	Rhode Island.....	30
Iowa	2223	South Carolina ..	387
Kansas	2287	South Dakota.....	1527
Kentucky	348	Tennessee	442
Louisiana	243	Texas	2235
Maine	53	Utah	88
Maryland	190	Vermont	75
Massachusetts..	91	Virginia	434
Michigan	945	Washington.....	209
Minnesota	1575	West Virginia ..	90
Mississippi ..	377	Wisconsin.....	904
Missouri	1141	Wyoming.....	186
Montana	808		
Nebraska	1773	Total.....	34,371

In the great plains region the tractor has already, practically, supplanted the horse, which was never at home in this

List of Tractor Manufacturers

Herewith, is appended a very full and comprehensive list of the manufacturers of tractors for field, road and stationary work:

Advance Rumely Co., Laporte, Ind.; Albaugh-Dover Co., Chicago, Ill.; Allis-Chalmers Mfg. Co., Milwaukee, Wis.; American Gas Engine Co., Kansas City, Mo.; American Mfg. Corp., Indianapolis, Ind.; American Tractor Co., Des Moines, Ia.; Andrews Tractor Co., Minneapolis, Minn.; Appleton Mfg. Co., Batavia, N. Y.; Albert Lea Tractor and Mfg. Co., Albert Lea, Minn.; Aulson & Sons, J. W., Wauregan, Ill.; Aultman & Taylor Machine Co., Mansfield, O.; B. F. Avery & Sons, Inc., Louisville, Ky.; Avery Co., Peoria, Ill.

Bates Tractor Co., Lansing, Mich.; C. L. Best Gas Traction Co., Oakland, Cal.; Birdsall Engine Co., Auburn, N. Y.; Boring Tractor Co., Chicago, Ill.; Brillion Iron Works, Brillion, Wis.; Buckeye Mfg. Co., Anderson, Ind.; Buckeye Traction Ditcher Co., Findlay, O.; Bull Tractor Co., Minneapolis, Minn.; Bullock Tractor Co., Chicago, Ill.

Canadian Rim Drive Tractors, Ltd., Toronto, Ont.; J. I. Case Threshing Machine Co., Racine, Wis.; Chase Motor Truck Co., Syracuse, N. Y.; Chief Tractor Mfg. Co., Detroit, Mich.; Cleveland Horseless Farm Machinery Co., Cleveland, O.; Cleveland Motor Plow Co., Cleveland, O.; Common Sense Gas Tractor Co., Minneapolis, Minn.; Commonwealth Tractor Co., Kansas City, Mo.; Corn Belt Motors Co., Wa-

Hackney Mfg. Co., St. Paul, Minn.; Happy Farmer Tractor Co., Minneapolis, Minn.; A. T. Harrow Tractor Co., Detroit, Mich.; Hart-Parr Co., Charles City, Ia.; Highway Tractor Co., Minneapolis, Minn.; Hoke Mfg. Co., South Bend, Ind.; Holt Mfg. Co., Peoria, Ill.; Homer Motors Co., Los Angeles, Cal.; Huber Mfg. Co., Marion, O.; Hume Mfg. Co., Hume, Ill.

Imperial Machinery Co., Minneapolis, Minn.; Independent Harvester Co., Plano, Ill.; International Gas Engine Co., Cudahy, Wis.; International Harvester Co., Chicago, Ill.; Interstate Engine and Tractor Co., Waterloo, Ia.

Joliet Oil Tractor Co., Joliet, Ill.; Kansas City Hay Press Co., Kansas City, Mo.; Kinkead Tractor Co., Minneapolis, Minn.; Killen-Strait Mfg. Co., Appleton, Wis.; Kinnard-Haines Co., Minneapolis, Minn.

La Crosse Plow Co., La Crosse, Wis.; La Crosse Tractor Co., La Crosse, Wis.; Lenox Motor Car Co., Hyde Park, Mass.; Lamson Truck and Tractor Co., Wasau, Wis.; John Lauson Mfg. Co., New Holstein, Wis.; Lawter Tractor Co., St. Marys, O.; H. W. Leavitt, Paris, Mo.; Lion Tractor Co., Minneapolis, Minn.; Lombard Traction Engine Co., Waterville, Me.; Long Tractor Co., Minneapolis, Minn.

McIntyre Mfg. Co., Columbus, O.; McKinney Traction Cultivator Co., St. Louis, Mo.; Mayer Bros Co., Mankato, Minn.; Maytag Co., Newton, Ia.; Mills-Ellsworth Co., Keokuk, Ia.; Minneapolis Farm Power Co., Minneapolis, Minn.; Minneapolis Steel and Machinery Co., Minneapolis, Minn.; Minneapolis Threshing Machine Co., Minneapolis, Minn.; Moline Plow Co., Moline, Ill.; Monarch Tractor Co., formerly John Deerfield Iron Works, Watertown, Wis.; Chicago, Ill.; Montgomery Ward & Co., Chicago, Ill.; Morton Truck and Tractor Co., Harrisburg, Penn.; Motor Driven Implement Co., Gallon, O.

National Pulley and Manufacturing Co., Chicago, Ill.; National Tractor Co., Wichita, Kan.; New Age Tractor Co., Minneapolis, Minn.; Nichols & Shepard Co., Battle Creek, Mich.; Nilson Farm Machine Co., Waukesha, Wis.

Ohio Manufacturing Co., Upper Sandusky, O.; Ohio Tractor Manufacturing Co., Marion, O.; Olin Gas Engine Works, Buffalo, N. Y.; Olmsted Gas Traction Co., Great Falls, Mont.; Oliver Chilled Plow Co., South Bend, Ind.; Orchard Machinery Manufacturing Co., Gasport, Ind.

Parker Motor Plow Co., Richmond, Va.; Parrett Tractor Co., Chicago, Ill.; Pacific Metal Products Co., Torrence, Cal.; Peoria Tractor Co., Inc., Peoria, Ill.; Phoenix Manufacturing Co., Eau Claire, Wis.; Pioneer Tractor Manufacturing Co., Winoona, Minn.; Plantation Equipment Co., Valley Park, Mo.; Pontiac Tractor Co., Pontiac, Mich.; Pullford Co., Quincy, Ill.

Reed Foundry and Machine Co., Kalamazoo, Mich.; Rock Island Plow Co., Rock Island, Ill.; Leo Rumely Tractor Co., Laporte, Ind.; Russell & Co., Massillon, O.; Reliable Engine Co., Portsmouth, O.; Rochester Gas Engine Co., Rochester, N. Y.; St. Paul Machinery Mfg. Co., St. Paul, Minn.; Samson Iron Works, Stockton, Cal.; Simplex Tractor Co., Minneapolis, Minn.; Southern Corn Belt Tractor Co., Atchison, Kan.; Standard-Detroit Tractor Co., Detroit, Mich.; Steel King Tractor Co., Detroit, Mich.; Strite Tractor Co., Minneapolis, Minn.; Sweeney Tractor Co., Kansas City, Mo.; Sullivan Tractor Co., Oakland, Cal.

Tom Thumb Tractor Co., Minneapolis, Minn.; Townsend Mfg. Co., Janesville, Wis.; Temple Mfg. Co., Cicero, Ill.

Union Tool Co., Oakland, Cal.; Universal Tractor Co., Inc., Brooklyn, N. Y.; Universal Tractor Co., Columbus, O.; Utility Steel Tractor Co., Antigo, Wis.

Velle Co., Moline, Ill.; Waite Tractor Sales Co., Chicago, Ill.; Wallis Tractor Co., Racine, Wis.; Ward Tractor Co., Lincoln, Neb.; Waterloo Gas Engine Co., Waterloo, Ia.; Weber Engine Co., Kansas City, Mo.; Westinghouse Co., Schenectady, N. Y.; Willmar Tractor Mfg. Co., Willmar, Minn.; Wolverine Car and Tractor Co., Detroit, Mich.

Yuba Construction Co., Marysville, Cal.



Harvesting Tractor Hauling Two Reaping and Binding Machines—Sulted to Small Farm.

area of hot summers. In the North, the line where 160-acre farms begin, runs from Duluth to Indianapolis, and then bends southwest down past St. Louis, through the eastern parts of Oklahoma and Texas. West of this line is the natural tractor area. To the West another line may be drawn which represents the limit of heavy crop production. It runs nearly on the west line of the Dakotas and Kansas, through the Panhandle to the Gulf. Between the two lines about 70 per cent. of the cereal crops of the United States is produced. Beginning at the top one finds practically all of the spring wheat belt and then the oats belt. Lower down is two-thirds of the corn belt. Farther down there is an important section of the cotton belt. In this area are 65 per cent. of the tractors now being used in the United States, according to a recent authoritative investigation. In the same area, and further West, are the great cattle ranches which supply meat to millions of mankind. The resources are vast. What will the harvest be?

terloo, Ia.; Corn Belt Tractor Co., Minneapolis, Minn.; C. O. D. Tractor Co., Minneapolis, Minn.

Dauch Mfg. Co., Sandusky, O.; Dayton-Dick Co., Quincy, Ill.; Denning Tractor Co., Cedar Rapids, Ia.; Detroit Engine Works, Detroit, Mich.; Detroit Tractor Co., Lafayette, Ind.; Diamond Iron Works, Minneapolis, Minn.; G. I. Dill Tractor Mfg. Co., Harrisburg, Ark.; C. H. A. Dissenger & Bros. Co., Wrightsville, Penn.

Eagle Mfg. Co., Appleton, Wis.; Eau Claire Mfg. Co., Eau Claire, Wis.; Electric Wheel Co., Quincy, Ill.; G. W. Elliott & Co., De Smet, S. D.; Emerson-Brantingham Implement Co., Rockford, Ill.

Fairbanks, Morse & Co., Chicago, Ill.; Fairmount Gas Engine and Railway Motor Car Co., Fairmount, Minn.; Famous Mfg. Co., Chicago, Ill.; Farm Engineering Co., Sand Springs, Okla.; Farm Horse Traction Works, Hartford, S. D.; Farmers Oil Tractor Co., Watertown, S. D.; A. B. Farquhar Co., Inc., York, Penn.; Henry Ford & Son, Dearborn, Mich.; Ford Tractor Co., Minneapolis, Minn.; Four Drive Tractor Co., Big Rapids, Mich.; Four Wheel Drive Tractor Co., Clintonville, Wis.

The Wm. Galloway Co., Waterloo, Ia.; Gile Tractor and Engine Co., Ludington, Mich.; Gramont Traction Plow Co., Springfield, O.; Gray Traction Mfg. Co., Minneapolis, Minn.; Green Bay Machine Co., Green Bay, Wis.



Large Insert at Left: Miss Ethel Parker, Interstate Dealer at Gateville, N. C.. Left to Right Above: Mrs. H. L. Gordon, in Liberty Car, Manager of Onondaga Garage, Syracuse, N. Y.; Two Saleswomen Employed by Distributors of National Cars in Cleveland. Below: Miss Helene Ditrien, Chalmers Distributor in France, When the War Started; Miss Jones, Sales-lady for Hupmobiles in Baltimore, Md.

Women Attracted to the Car Selling Field

Saleswomen Who Undertake Positions in the Distributing End of the Business, Conduct Garages, Sell Accessories Meet With Success

WOMEN are found in many capacities throughout the vast automobile industry, in the business offices and in the shops, but, odd as it may seem, only a few are to be accounted for in the great distributing end of the business. Inquiries of the sales managers of the automobile companies as to whether any women were engaged in the business of distributing their cars were in most cases answered in the negative, although there were a few scattering cases where the names of maids and matrons were given who were agents for automobiles or were connected with some agencies in the capacity of sales ladies.

Not alone in this country, but abroad, this field, owing to its highly remunerative possibilities, has attracted a number of the fair sex and from all reports they have been successful as a rule.

Motor, transmission, carburetor, electrical mechanisms must be thoroughly understood by the saleswomen, the names of all the intricate parts must be in her vocabulary, and roll from her tongue with the same fluency that the average woman applies in the nomenclature of fashions.

Since women, however, have a facility for describing anything with greater minuteness and enthusiasm than men, this trait stands them in good stead in the business of selling motor cars when they are qualified otherwise. The effect of a demonstration seated alongside of a neat and chipper saleswoman of course has considerable weight in influencing the customer, and is an element not to be overlooked.

There were about 40 girls in all selling cars this year at the Boston show, which is sometimes referred to as New England's principal motor car debut, but is conceded everywhere now to have been a "large show." A feminine oasis in the desert of masculinity was particularly noticeable in the Metz exhibit, a fact which was emphatically depicted in a photograph of Metz hall at the show, reproduced in the *Automobile Journal* March 10. The Metz company is out in a statement that women are a big success in the sales end of the motor car industry. These girls were trained in a special school arranged several months beforehand and is credited as the first experiment on a large scale that any au-

tomobile manufacturer has made. Manager Roscoe A. Pickens says "there is no reason why there should not be as many women selling automobiles as men. They have proven themselves a success selling automobiles and on a scale from which it is possible to judge."

Some of those who take places in the distributing end of the business own their own cars and are so versed in its mechanism that they are fully capable of keeping it out of the repair shop from year end to year end. It is a far cry from manipulating a typewriter to elucidating the mysteries of battery ignition systems, or the simplicity of a transmission, but business girls who go in for this sort of thing find it a far different engagement of their talents. They learn their lessons well in various commercial practises, are entertaining to prospective customers and make many, many sales.

The newly arisen war conditions have stimulated many women to grasp a mechanical problem and know a car well enough to sell it. A number conduct agencies and garages. These instances are found North as well as South, East,



Miss Helen Moore, Seattle, Wash.,
Saleswoman for Havoline Oil.

as well as West.

The selling of accessories is another phase of the automobile business, and women employed in this branch are also found to be giving a good account of their capacities for success.

Miss Helen Moore, Seattle, Wash., may probably be the only honest-to-goodness oil saleswoman in the country. However, she is an actual seller. She is a good one and has doubled the business of the Indian Refining Co. in Seattle since she became manager of that branch.

She is an enthusiastic motorist and calls on the Havoline customers with her car. Having carefully studied lubrication problems of every kind she uses practical commercial presentations of her goods to win customers.

"CALL TO COLORS" FROM RUSSEL AXLE CO.

The Russel Motor Axle Co., Detroit, Mich., has sent out "The Call to Colors" in the form of a patriotic booklet bearing that title and containing Woodrow Wilson's speech to Congress on April 3. An American flag in colors is on the cover and the President's picture is shown opposite the first page, which is captioned, "The President's Plea for a World Democracy."

UNITED GARAGE CO. TO ESTABLISH WAREHOUSES.

The United Garage Co., which has been organized in Boston by a number of well

known Massachusetts bankers, real estate and automobile men, will establish a chain of warehouses and garages throughout New England.

In each city where a garage is established it will be known as the Standard Garage and they will be so erected and equipped that it will be an easy matter for the tourist to identify them when going through a city. Sign boards will be erected along the roadways directing the motorist to the nearest Standard Garage and the service will be standardized throughout the system so that patrons will know just what to expect in the way of charges and

work. It is planned to have a well appointed ladies' room in each garage, with a matron in charge.

James D. Henderson of Henderson & Ross, Boston real estate dealers, and a well known banker, is president of the United Garage Co. Chester I. Campbell, director of the Boston Automobile Show, who is president of the Quincy Trust Co. and the new Back Bay National Bank, is interested in the company, together with Edward M. Hamlin, president of the Melrose Trust Co.; John J. Prindville, contractor and builder; E. T. McKnight, president Medford Trust Co.

HENRY FORD SOON TO MAKE TRACTORS.

Henry Ford & Son, Dearborn, Mich., tractor manufacturers, will soon start production on their new farm tractor, which has been quietly developed and tested in this country and abroad. Two machines have been in the hands of agricultural experts in England for some time and after a thorough trial were pronounced highly satisfactory and similar tests have also been carried out in various parts of this country.

By Aug. 1 it is expected that the plant at Dearborn will be turning out several hundred of the tractors daily.

SHORTAGE IN GASOLINE PREDICTED BY DR. BURTON.

Dr. Burton of the Standard Oil Co., in speaking before a meeting of the members of the council of the S. A. E. at their meeting in Chicago, predicted that this

year's gasoline production would be insufficient to meet the needs of all classes of motor car users.

Estimating the production at 2,500,000,000 gallons, of which, he said, American automobiles would use 2,000,000,000, there would be left only 500,000,000 gallons for use by military trucks and for export.

THE APPERSON BROTHERS ROADAPLANE BOOKLET.

The Apperson Brothers Automobile Co., Kokomo, Ind., makers of the Apperson Roadaplane, has issued an interesting little booklet entitled "The Roadaplane Book," which not only gives the history of the Apperson brothers and their identification with the motor car industry since its inception, but describes in detail each of the essential parts of the chassis and how constructed.

With the issue of the book a new price schedule, which went into effect on April 15, was announced. This list, in which changes in the prices of the six-cylinder models are noted, is as follows:

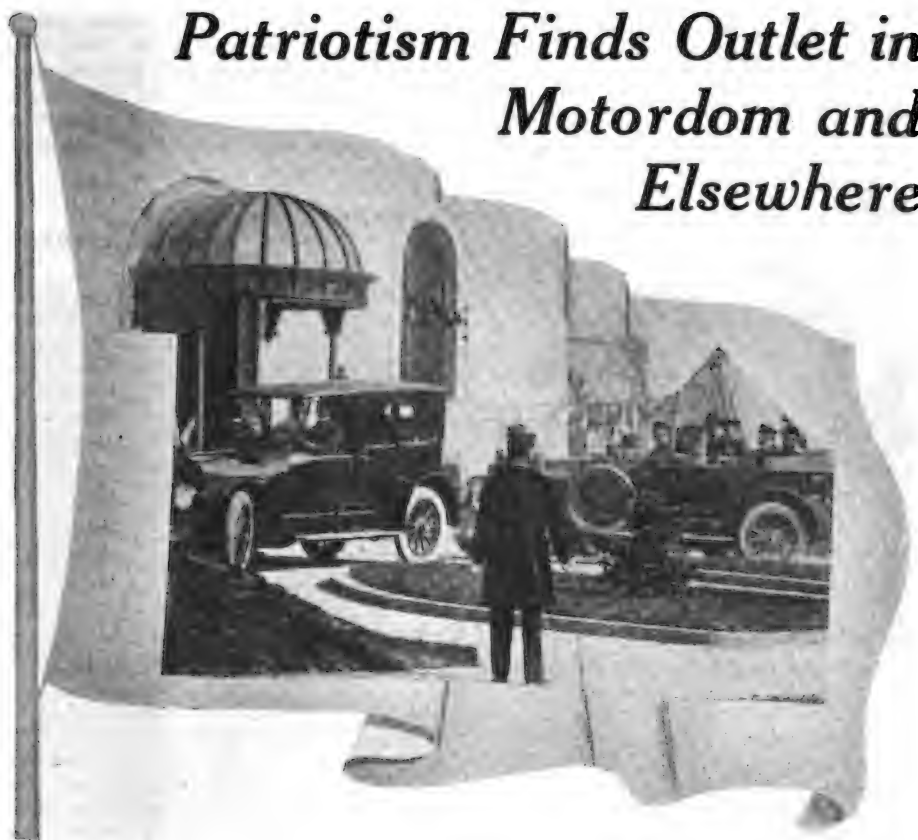
6-17-7	Seven-passenger touring.....	\$1850
6-17-4	Four-passenger chummy.....	\$1850
6-17-5	Five-passenger touring.....	\$1790
8-17-7	Seven-passenger touring.....	\$2000
8-17-4	Four-passenger chummy.....	\$2000

All prices are quoted as f. o. b. Kokomo, Ind.



Roadaplane Seat Arrangement.

Patriotism Finds Outlet in Motordom and Elsewhere



POLITICALLY and in every other way in which the motorist is interested in the fate of the nation, the real beginnings of war time events came in this country with the coming of the Allied commissioners to Washington. The presence in the United States of Arthur J. Balfour of England, General Joffre, marshal of France, and other notables, crystalized the patriotism of the land, which has been straining everywhere for expression for weeks, since the declara-

tion of war. What to do and what is to be done began to materialize. Enlistment, automotive transport, financing and the furnishing of food to the world are met with a serious grapple from this time on. Within the folds of the flag, at the head of this page, is presented a picture of the arrival of the Balfour party at the commissioners' headquarters in Washington. Marshal Joffre three days later was given a heroic welcome by the people of the capitol.

TREASURER MCADOO SUGGESTS AUTO TAX.

W. G. McAdoo, secretary of the United States treasury, recommends that a tax be levied against motor cars as a means of raising war revenues. His schedule for taxation as submitted to Congress fixes an assessment on an ascending scale according to price as follows: Under \$500, \$1 tax; \$500 to \$750, \$2; \$750 to \$1000, \$3; \$1000 to \$1500, \$5; \$1500 to \$2000, \$7; over \$2000, \$10.

TRADE PRESS OFFERS PUBLICITY SERVICES.

IN CONJUNCTION with the Editorial Conference of the New York Business Publishers' Association, Inc., the Automobile Journal Publishing Co. has tendered to the government editorial co-operation and free advertising space to support government activities in connection with the war. This extends the services of this company's three publications, **THE AUTOMOBILE JOURNAL**, the **Motor Truck** and the **Accessory and Garage Journal**.

The tender made includes the services of 277 trade journals of the United States. The Editorial Conference in making its announcement of its action, believes it will be of interest to all who appreciate the power and influence of this important section of the press, and an opportunity to show leadership in the present national emergency.

It is proposed to keep closely in touch with the government with its work and wherever matters of importance develop readers will be put in possession of these facts.

Wartime Items From the Shops and Countryside

Motor ambulances, supplementing the mule drawn ambulances already in service, will be provided for the Indiana National Guard through an offer of the Stutz Motor Car Co. through its president, Harry C. Stutz, to donate six chassis constructed especially for ambulance purposes.

That America's supremacy in the manufacture of guns and ammunitions is based on the knowledge gained in automobile manufacture was the statement made by W. C. Peterson, metallurgical expert of the Packard Motor Car Co., at a meeting of the Packard salesmen at the Hotel Thorndike, Boston.

The Motor Truck Club of America has been asked to provide the government with 1400 chauffeurs, skilled and trained in their work to man 40 motor truck companies of 27 trucks each, each company requiring a total of 35 men for its complete equipment.

Charles Fry, well known as the designer of the Biddle car, has received permission from the secretary of the navy to enlist in the Naval Reserves as an automobile instructor. Special permission had to be secured for his enlistment, as he has only one arm.

The Locomobile Co. of America at

Bridgeport, and the Metz Co., Waltham, Mass., recently held flag raisings in which the officials and employees participated. The Metz company has set aside 50 acres to be used by the employees as garden plots.

The men of the automobile spring department of the Detroit Steel Products Co., including many of foreign birth, recently raised a sum of money and purchased a large American flag, which now hangs in the most conspicuous part of the spring factory of the plant.

When the news that the President had signed the declaration of war came, over 500 employees of the United States Motor Truck Co., Covington, Ky., formed in line and paraded through the streets of the city, headed by the officials of the company.

The Climax Shock Absorber Co., Benton Harbor, Mich., has offered to contribute to the Red Cross or similar funds, 20 per cent. of the price of every set of Climax shock absorbers sold to car owners before June 30.

E. C. Morse, vice president and general manager of the Chalmers Motor Co., recently excused for the day 100 employees, who were going to take out their first naturalization papers.

A Red Cross campaign is being conducted by the Cleveland Automobile Club, each member being required to secure 10 members for the local Red Cross organization.

The Automobile Trade Association of Philadelphia and the Motor Truck Association have pledged 58 cars and trucks for war service in case they are needed. An ambulance to cost \$1000 was also provided for.

The 45-acre athletic field of the Fisk Tire and Rubber Co., Chicopee Falls, Mass., has been offered to the government to be used as a mobilization or training field.

The plant of the Wagner Electric Co., St. Louis, Mo., which has been turning out munitions for the Allies, has been offered to the government.

An offer of 5000 automobiles and the services of 3000 members has been extended to the government by the Automobile Club of St. Louis.

Officers of the Marine Corps have arranged to send the King armored car to all the large cities in the country as a means of stimulating recruiting.

An American flag poster is placed on the windshield of every Cole car shipped from the factory.

First Body Model of Darling Car



*A Darling—When You've
Called It by Name,
You've Said It.*

Varied Fittings to 130-inch Wheelbase Will Be Made in the Old Wright-Martin Plant, Dayton, O.

THE Darling car to be manufactured by the Darling Motor Co., which recently acquired the Wright-Martin plant at Dayton, O., as previously announced in the Automobile Journal, has many distinctive features for a class selling under \$2000.

All the different body types will be fitted to the same chassis, which has a wheelbase of 130 inches.

It is equipped with a model 7-N Continental six-cylinder engine, $3\frac{1}{2} \times 5\frac{1}{4}$; Timken axles, Borg & Beck disc clutch, Stromberg carburetor, Bijur starting and lighting system, Kellogg tire pump, Atwater Kent ignition system and Stewart vacuum feed. Conaphore lenses, Boyce motometer and demountable wire wheels are standard equipment also.

FAGEOL WITH AVIATION MOTOR MAKES RECORD.

A remarkable acceleration record was established in Oakland, Cal., by a Fageol car, which was driven to a speed of 25 miles an hour from a standing start and brought to a standstill in a distance of 40 feet. The spectacular test was staged at the Hotel Oakland at the annual banquet of the Alameda County Manufacturers. A run way 75 feet long was laid in the ball room and with Claud Fageol at the wheel and five guests as passengers, the demonstration was made. The speedometer indicator reached the 25-mile point and the timers announced that just four seconds had elapsed from the time the start was made until the car came to a stop. The Fageol used was the \$12,000 model, equipped with a Hall-Scott aviation motor.

ATLANTIC CITY SHOW PROVED BIG SUCCESS.

The automobile and accessory show at Atlantic City, held on Garden Pier, in the big dance halls, proved a big success. There were about 20,000 people in at-

tendance during the 12 days that the exhibition was open. These visitors, however, were more than sightseers, as over 200 cars were sold and many good prospects were booked.

Practically all of the members of the Atlantic City Automobile Trade Association participated in the show, which consisted of 125 automobiles, exhibited by

37 dealers, including six truck dealers and 13 accessory dealers. The show rooms contained 36,300 square feet, which was sold to exhibitors at 25 and 35 cents per square foot. A flat price of \$50 a space was charged for accessory exhibits.

HARKNESS TAKES OVER SHEEPSHEAD BAY TRACK.

Harry S. Harkness, president of the Sheepshead Bay Speedway and the man who furnished most of the money to build the automobile course which was recently ordered sold by the court to satisfy the claim of a mortgage for \$2,040,000, has become sole owner of the property through the purchase of the mortgage for \$1,650,000, and \$550,000 in notes bearing his indorsement.

It is not probable that any racing contests will be held on the Sheepshead Bay course this year.

STUDEBAKER CAR FIRST IN YOSEMITE VALLEY.

A Studebaker seven-passenger 18 series model car was the first to reach the floor of the Yosemite valley this year and won the Desmond silver trophy offered. The crew of the car was sent out by the Chester N. Weaver Co., San Francisco distributors for Studebaker cars. The trip into the valley was made over the Coulterville road from San Francisco through heavy snow storms.

COMING EVENTS

AUTOMOTIVE MEETINGS.

Standards Committee, S. A. E., Cleveland, O.	May 3
American Society of Mechanical Engineers, annual spring meeting, Cincinnati, O.	May 22-25
American Automobile Association, directors' annual meeting, Cleveland O.	May 25
Society of Automotive Engineers, summer meeting at Washington, D. C.	June 25

AUTOMOBILE RACES.

Uniontown, Penn., Speedway	May 10
New York, Sheepshead Bay, Speedway, Metropolitan	May 19
Walla Walla, Wash., Track	May 30
Uniontown, Penn., Speedway	May 30
Chicago, Ill., Championship, Speedway	June 9
Kansas City, Mo., Speedway	June 16
Cincinnati, O., Speedway	June 23
Omaha, Neb., Championship, Speedway	July 4
Spokane, Wash., Track	July 4
Tacoma, Wash., Speedway	July 4
Uniontown, Penn., Speedway	July 4
Visalia, Cal., Road Race	July 4
Benton Harbor, Mich., Track	July 4
Des Moines, Ia., Speedway, Championship	July 14
Minneapolis, Minn., Track	July 15
Buffalo, N. Y., Intercity, Road	July 17-19
Anaconda, Mont., Track	July 22
Tacoma, Wash., Championship, Speedway	July 28

Great Falls, Mont., Track	July 29
Kansas City, Mo., Speedway (dirt)	Aug. 4
Billings, Mont., Track	Aug. 5
Elgin, Ill., Road Race	Aug. 18
Spokane, Wash., Interstate Fair	Sept. 2-9
Cincinnati, O., Championship, Speedway	Sept. 3
Red Bank, N. J., Track	Sept. 6
Pikes Peak, Col., Road Climb	Sept. 8
Milwaukee, Wis., at State Fair Park	Sept. 9-15
Providence, R. I., Championship, Speedway	Sept. 15
Allentown, Penn., Track	Sept. 22
Trenton, N. J., Track	Sept. 28
New York, Sheepshead Bay Speedway, Championship	Sept. 29
Uniontown, Penn., Speedway	Sept. 29
Kansas City, Mo., Speedway	Oct. 6
Uniontown, Penn., Speedway	Oct. 6
Danbury, Conn., Track	Oct. 6
Chicago, Ill., Speedway, Championship	Oct. 13
Richmond, Va., Track	Oct. 13
New York, Sheepshead Bay Speedway	Oct. 27

SHOWS AND CONVENTIONS.

National Association Automobile Accessory Jobbers, Convention, Summer meeting, at Homestead Hotel, Hot Springs, Va.	June 4-6
Milwaukee, Wis., first annual used car show	April 20-26
Chicago, Ill., used car show	May

Fair Motorists in the Raiment of Spring

Straight, Loose Lines Typical
of the Smartest New Models

ONE of the distinctive motor novelties offered this season is shown in a curious combination of brim and hood, both in white georgette. The treatment of a huge white scarf is such that it appears quite like the headgear of the nuns and is topped by a broad brim of this face. It is shown by James McCreery & Co., New York City.



(Photos by Joel Feder, New York.)



ONE of the essentials for motoring, as the season advances, is a lightweight coverall coat, which will insure comfort and carry with it as well the satisfaction that when one steps out of the car it will fulfill all the requirements of modish apparel wherever one may be.

Among the numerous smart models seen among spring coats is one tailored by Balch Price & Co., which is becoming to the wearer and is appreciated in such a particular need. It is shown above in natural pongee with large embroidered figures worked in gold, rose and yellow shades. The straight, loose lines are typical of the smartest new models.

ONE needs an extra sport suit in the motoring hamper to fit in on a cloudy day, consequently one in medium dark tones proves particularly practical. This blue and gray wool Arnold Constable & Co. model, shown above, is regarded by connoisseurs as especially appropriate. The plaid material is confined to the development of the skirt, collar trim and a nobby belt, while the coat itself is of gray worsted.

A very interesting suit by Walther & Co. is shown at the left, in tan gabardine, featuring a pleated skirt and hip length, belted coat. The envelope pockets and cuffs are unusual, while high collar with its rather severe treatment is particularly smart.

PLATE ONE

A ONE-CAR FIRE-PROOF PRIVATE GARAGE

Roomy, Serviceable Building Meeting All Municipal Regulations,
Adaptable to a Lot of Restricted Area

Design by the Architectural Department of the Automobile Journal Publishing Co.

EMBODYING all the structural points which go to make a first class garage, a one-car fireproof structure is shown on the opposite page. The plan for this garage is so complete in structural detail that the man who is determined to provide an adequate housing for his car on his own premises simply needs to call in the contractor and material dealer, and between them the garage will soon be ready for occupancy.

Second in importance only to the building of the home is the building of the garage. It is essential that it shall be not only serviceable in every respect, roomy and well equipped, but that, whether it be in the city or country, it shall give the best protection possible to the car. It may be restricted lot room, or it may be city building regulations which will have a large influence in the lines of construction of the one-car private garage, such as is here illustrated. At all events, the design is fitted to either location, city lot or country estate. It is shaped to admit the installation of every convenience that is known to the garage building art, practically as one pleases.

This garage is constructed of eight-inch hollow brick tile. The walls are of stucco and have the exterior decorated with colored terra cotta tile in frieze beneath the brackets of the cornice. The floor is of concrete, surfaced with cement, and the roof is of reinforced concrete construction, covered with tar and gravel.

In a building of this type concrete footings and floors are appropriate. The general construction above the floor is along the lines of ordinary hollow tile wall construction. As shown to scale in the wall detail drawing, the exterior facing is of one-inch stucco and the interior finish of Portland cement plaster. Two 3x4x½ inch angles, securely riveted, are used in the head to sustain the weight of the brick over.

In this garage the doors are hung with side wall attachments, and guides are set in the floor. It is to be noticed that by the use of sliding doors this splendid one-car private garage may be set on an alley line and present no obstruction to the sidewalk. Another feature at the entrance is the cast iron guard fastened to the door jamb, an incorporation which minimizes the chance of damage to wheels, hubs or the jamb itself, in case of a close turn in or out the building. Concrete lintel or beam can be used as desired.

The pit, essential to any garage of real serviceability, in this structure is given especial attention, equipment and placement. It is, to scale,

three feet wide, four feet long and four feet deep. Set in the centre of the floor, it is provided with a drain, and likewise fitted to choice with a wood or a movable iron cover.

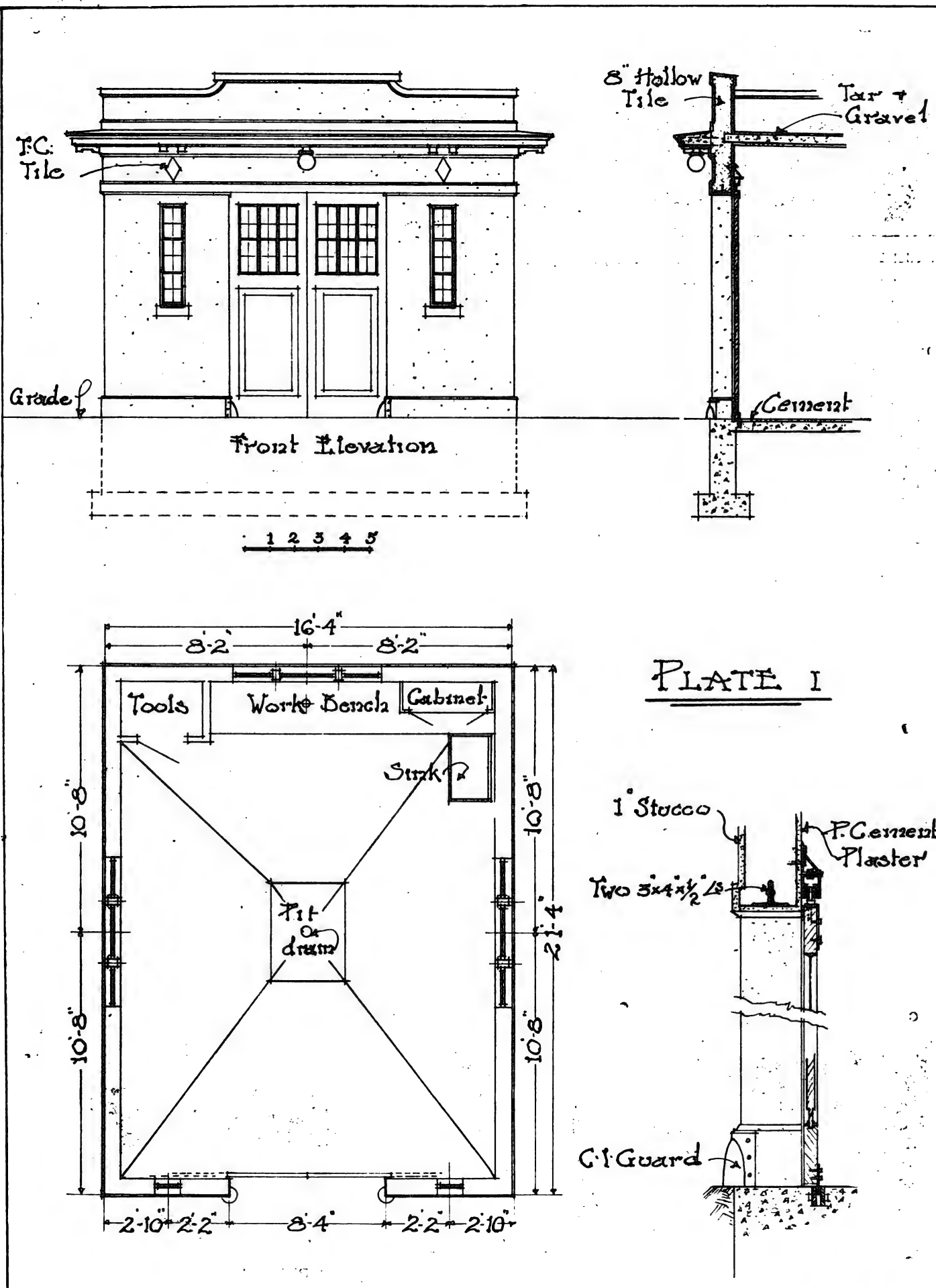
At the rear end of the garage is a work bench of two-inch plank, which to the scale is one foot 10 inches by 10 feet three inches, with a cabinet containing generous shelf room space, a sink and a tool closet three feet three inches by two feet three inches.

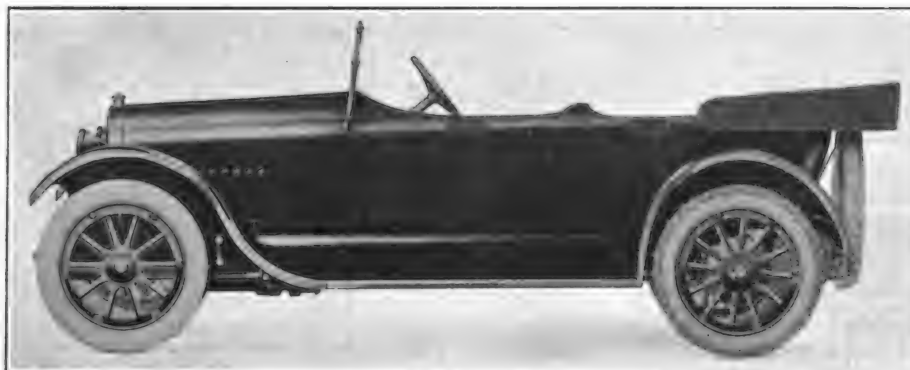
The roof of the garage is pitched one inch to the foot. As the roof is of tar and gravel, in handling the material, the concrete is first coated with hot pitch on which two thicknesses of tarred felt are placed, the edges lapping 17 inches, thus giving a two-inch head cover on a roofing felt of 32 inches. The exposed edges of the felt are nailed as often as necessary to hold the sheets in place until the remainder of the felt can be applied. Over the entire surface of felt there is spread a coating of pitch, mopped on. Then three thicknesses of felt are laid, lapping each sheet 22 inches over the preceding one, nailed as laid, and mopped with pitch the full width of 20 inches under each lap. Finally, there is spread over the entire surface of the roof a uniform coating of pitch, into which, while hot, gravel is imbedded.

The garage is well lighted, having two windows in the front, besides a window in each door, with windows also on the sides and in the rear elevation. The windows are metal sash and trim, in accordance with underwriter's regulations for fireproof construction.

The outside treatment of the garage is restricted to a simplicity of ornament, which would meet almost any taste. In this respect, however, there could be options to accord with the architectural caliber of other buildings. The colored tile used in the design makes a pleasing combination with the stucco and relieves the panel of too much plainness.

The cost is approximated, complete with cluster lights, plumbing, etc., at \$1142.40. The cost of heating apparatus depends largely upon the type of heater. It may be that the garage is close enough to the house so that a steam or hot water pipe can be run from the house equipment. Individual options would materially alter the cost figures. The matter of the completeness of garage equipment rests always with the individual. However, in locating gas tank and pump, it is advisable to have the filling pipe for the gas tank in the most convenient place for the tank wagon, near the door or window.





Model D Five-Passenger Touring Car, a Long, Roomy Car with 115-Inch Wheelbase.

THE Elcar model for 1917 is replete with new and improved mechanical features, combined with quality, at a popular price. For domestic consumption and for export the Elkhart Carriage and Motor Co. of Elkhart, Ind., set themselves to the task of turning out a quality job. From one end of the car to the other the designers' art is in evidence and refinements are found wherever refinements might be made.

The new Elcar model has a longer wheelbase, more room for the comfort of passengers, a refined, elastic spring suspension, insuring easy riding qualities, attractive body designs and a power plant which, on dissection, bears the imprint at every point of the particular stress it has been given.

Strength and simplicity are the characteristic features of the engine. This unit is of the four-cylinder, L head type, which, having a $3\frac{1}{4}$ -inch bore and five-inch stroke, develops 19 $\frac{3}{5}$ horsepower, S. A. E. rating. An actual brake test, however, shows 34.7 horsepower at 1800 revolutions per minute, while with even as low a speed as 400 revolutions per minute, the output is eight horsepower.

Points as to the Cylinder.

The cylinders are cast in block, of a high grade of gray iron, with water jacket, which surrounds valve passages. The water inlet is located in the centre of the block, low enough so that complete drainage of water is assured through the radiator. The cylinders, after being roughly bored, are subjected to a high pressure to insure against leaks and imperfections. After a thorough seasoning they are ground to size.

Cylinder block and heads are cast separately, allowing space for large valves and enabling perfect setting of cores and uniform thickness of walls, thus adding to the efficiency of the cooling system. The cylinder heads are held in place by heat treated nickel steel bolts.

Cast of the same quality of close grained iron as is used in the cylinders, the pistons are carefully turned, being centred from the inside, annealed and ground to size. They are comparatively light, but very strong. Each piston is fitted with three rings, each ground on three sides and carefully fitted to the piston ring grooves.

The crank case is made in two sections, the upper half, in which are carried the crank and camshafts, is extended so as to form the upper part of the clutch housing. The lower half comprises the oil basin and when removed easy access may be had to the reciprocating parts of the engine.

Supported upon two ample sized white metal bearings, $1\frac{1}{4}$ inches in diameter, the front $3\frac{1}{4}$ inches long, the rear four inches long, the crankshaft is of .40-50 carbon steel, double heat treated and bolted to the flywheel through a flange, which is forged integral with the shaft.

I Beam Type Connecting Rods.

The connecting rods are of the I beam type, 40 carbon steel, drop forged and double heat treated. The lower bearing of the rod is of the split type, $1\frac{1}{4}$ inches in diameter by $2\frac{3}{4}$ inches long. The cap is held on by two nickel steel bolts. The wristpin is hollow and made of high grade case hardened steel, heat treated and ground to size. It is held in the pis-

Elcar Series of Models Season With

ton by means of a set screw, which in turn is locked by a cotter pin.

The camshaft is made from low carbon steel and is carried upon three die cast white metal bearings of specially large size. Each cam is separately tested for hardness and eccentricity. Being driven by helical gears, smooth and quiet running of this important part is assured.

Located upon the right side of the motor the valves and push rods are entirely enclosed. The valves are made of gray iron heads, fused to steel stems. The pushrods are of the flat head type, made of special case hardening steel properly treated and ground, and provided with hardened adjusting screws and lock nuts.

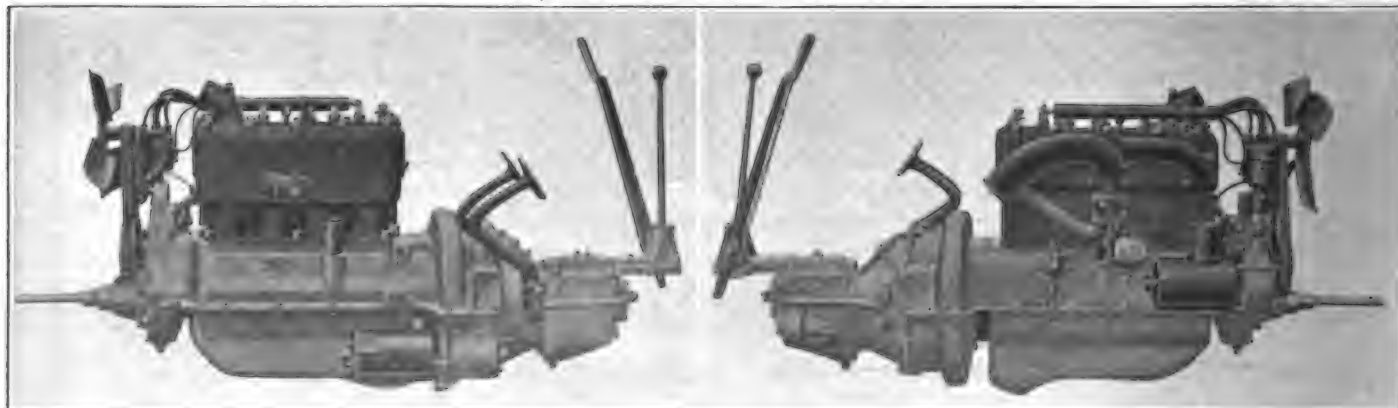
The Lubrication System.

Lubrication is provided by means of the splash, constant level system, the level being maintained by a plunger pump driven by an eccentric on the camshaft. Each connecting rod is provided with an oil scoop, which insures positive lubrication to all reciprocating parts under all road conditions.

A thermo-syphon cooling system is used. Extra large inlet and outlet pipes are used, connecting with tubular type radiator of pleasing design. Radiation is furthered by a four-blade cooling fan mounted on adjustable bracket and driven by a belt from the camshaft.

The fuel is furnished by a standard carburetor with manually controlled valve. The travel from carburetor to cylinders is short, and as the intake manifold is cast integral with the exhaust, vaporization of the fuel is assured.

Current for ignition is taken from a Willard six-volt, 90 ampere-hour storage battery and distributed by a Delco automatic spark advance high-tension ignition system. Provision of the automatic spark advance relieves the driver of all concern as to this important, but technical



Left Side of Engine.

Right Side of Engine.

Four Cylinder Enter the New Features

and difficult feature of motor car operation, except that at very low speed under open throttle and heavy load it is advisable to retard the spark by means of the manually controlled lever on the steering column.

Suspension of Engine.

The engine is suspended in the chassis by the three-point suspension system and forms a unit with the transmission gearset and clutch. All moving parts are enclosed and the compactness and accessibility of the different parts is readily seen.

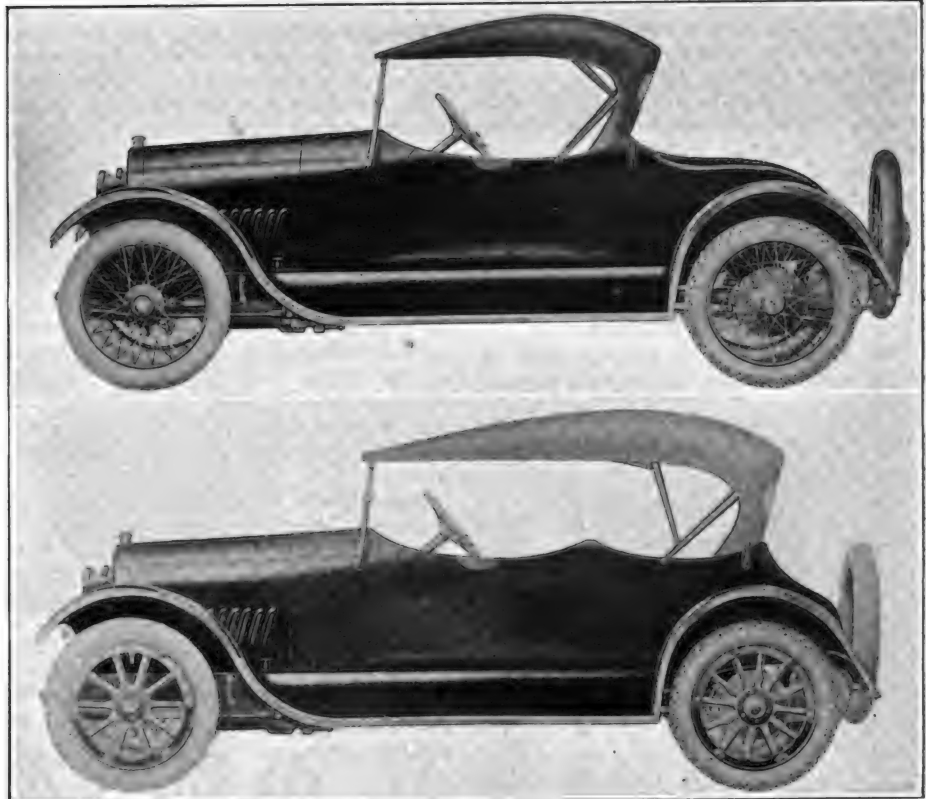
The clutch is of the multiple dry disk type. It is made of seven plates, steel on raybestos, mounted in a bell housing with the flywheel, and carried upon ample sized bearings, which are lubricated with oil from the transmission gearset case.

Cast integral with the rear half of the clutch bell housing is the transmission gearset. The gearset is of the selective sliding gear type, with three forward speeds and one reverse. The gears are made of nickel steel, heat treated and are cambered to make engagement easy and silent. The sliding gears are held securely in positions to which they have been shifted by safety catches. The main transmission shaft is mounted on annular ball bearings of large size and the countershaft, which carries no load except when running on low or intermediate, has phosphor bronze bearings of liberal dimensions.

Universal Joint Operation.

The universal joint operates in a housing at the rear of the transmission gearset and is packed with lubricant. It is very strong, each of the four bearings being $\frac{3}{4}$ inch in size.

The rear axle is of the full floating



Model F Two-Passenger Roadster, with Wire Wheel Equipment; Four-Passenger Touring Roadster. Both Priced at \$845.

type with roller bearings at each end of the hub spindle, so that all lateral stresses, as well as the load, are borne on the axle housing. The differential is of the four-pinion type and the driving load is carried on long Hyatt roller bearings with ball bearings to support thrust stresses. A large cover plate affords access to the interior.

The master, or ring gear, which is spiral cut, is made of high carbon manganese steel, the pinion being nickel steel. The drive shaft thrust is taken upon ball bearings.

A one-piece drop forged I beam section of .20-.30 carbon steel, heat treated with integral spring pads and extra strong $4\frac{1}{2}$ -inch yokes and drop forged steering knuckles, forms the front axle.

Semi-elliptic springs are employed both front and rear, the front springs are $1\frac{1}{4}$ inches wide and 34 inches long, with rebound clips. The rear are two inches wide by 52 inches long and are hung under the axle on swivel pads. They are made of a special alloy and carefully heat treated. All spring bolts are $\frac{3}{4}$ inch in diameter, hardened and ground and fitted with grease cups and nut locking devices.

The frame of this car is constructed

of $\frac{5}{32}$ inch pressed channel section steel, rigidly reinforced. The width at the front is 30 inches; at the rear, 36 inches, with an up throw of $3\frac{1}{4}$ inches. This form of construction permits a low mounting of the body.

The wheelbase is 115 inches, which means a long and roomy car. The regular wheel equipment is high grade, artillery type wood wheels with bossed spokes in the rear, fitted with demountable rims carrying 32 by $3\frac{1}{2}$ -inch straight side tires with non skids provided on the rear wheels.

The car is controlled on the left. The steering gear is of the worm and gear type, with ball thrust bearings above and below the worm. Adjustments for wear are provided. The gear shift and emergency brake are mounted at the centre of the car within easy reach of the operator when seated at the wheel.

Theoretically the braking mechanism is sufficiently powerful and efficient to handle a car of 50 to 75 per cent. more weight. The drums are 12 inches in diameter, with internal expanding emergency brake shoe and external contracting service brake, both full two inches in width and double acting. Ample provision is made for adjustments.

Electrical Equipment.

The source of electrical supply is a Dyneto generator, rigidly bolted to the timing gear case of the engine and driven by a reducing gear in mesh with the camshaft gear. The output charges a Willard storage battery, which is mounted on the chassis frame. An ammeter mounted on the dash indicates the rate of charge or discharge of the battery. On the opposite or left hand



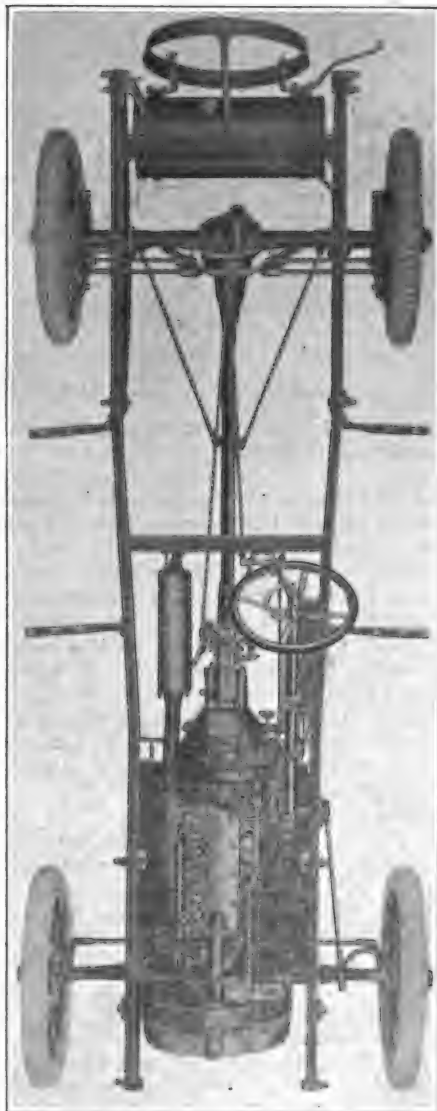
Four-Pinion Type, Elcar Differential, with Spiral Bevel Driving Gears.

side of the crank case, bolted to the fly-wheel housing, is the starting motor of sufficient power to turn the engine at an approximate speed of 120 revolutions per minute. All lights are equipped with electric globes and controlled by a dash switch.

Either of four bodies are fitted to this chassis. A five-passenger touring car, a four-passenger touring roadster and a two-passenger roadster at a price of \$845, and a five-passenger enclosed car at \$995.

Bodies and Equipment.

The greatest of care and the best of workmanship is put into all the bodies.



Trim Chassis, Top View.

Kiln dried hard woods are used, 20-gauge cold rolled steel is used for the surfaces. All doors are hung on concealed self-stopping hinges with fasteners on the inside. The bodies are mounted with felt padding between sills and chassis frame to eliminate squeaks.

The upholstery is deep, the coiled springs in the cushions being eight inches high, 32 springs in the forward cushion and 40 in the rear. The upholstery is done in high grade leather.

Wood wheels are standard equipment on all models. Wire wheels are special

and at extra cost. With the regular wheel equipment an extra rim and spare rim and tire carrier with mechanical fasteners is furnished. A Stewart flush type speedometer, electric horn, wind-shield, top and side curtains complete the equipment.

NEW JERSEY DIVISION OF PIKES PEAK HIGHWAY.

A New Jersey state division was added to the Pikes Peak Highway Association at a recent meeting of road enthusiasts in that state. The New Jersey division of the Pikes Peak Highway joins the William Penn Highway at Easton, Penn. The William Penn Highway is the Pennsylvania division of the Pikes Peak Highway.

The officers of the New Jersey division are: President, Benjamin S. Whitehead, president of the New Jersey Auto and Motor Association; vice president, W. Eugene Turton; treasurer, James Reilly, secretary of the Newark, N. J. Board of Trade; secretary, W. H. Ellis. In the near future a board of governors will be named and the exact routing of the highway through the state will be decided upon.

CINCINNATI TO HAVE RACE ON DECORATION DAY.

The Cincinnati Speedway has been awarded the Decoration day date for holding a speedway championship event. This date was held by the Indianapolis Speedway for the 500-mile classic, but owing to the war the management withdrew from racing activities for the year.

ROYAL R. SCOTT HEADS OHIO AUTO ASSOCIATION.

At the annual convention of the Ohio State Automobile Association held at Springfield, O., Royal R. Scott of Toledo, secretary of the Willys-Overland Co., was elected president of the organization.

The other officers elected are: Vice presidents, George H. Kile of Akron, F. F. Bentley of Warren, George E. Mentel of Springfield and E. R. Roemer of Zanesville; secretary, Fred H. Caley; treasurer, Harry E. Freeman. C. C. James and Jacob L. Will were elected trustees and Richard H. Lee was elected to the board of directors of the company.

DECISION GIVEN IN BIG DU PONT STOCK SUIT.

An opinion has been filed at the United States District Court at Wilmington, Del., deciding in the favor of the plaintiffs in the \$57,000,000 Du Pont stock suit. Judge J. Whitaker Thompson of Philadelphia, in the opinion, says that the acquisition of the stock by the Du Pont Securities Co. was illegal and that the board of directors was disqualified from passing on it. The stock was purchased from Gen. T. Coleman Du Pont for \$14,000,000, and is said to have a value at present of \$57,000,000.

GEN. GOETHALS NOW A ROAD BUILDER.

Gen. George W. Goethals has accepted an appointment as state engineer of New Jersey. He is to act as "advisor to and supervisor of" the newly created state highway department, as well as the plans and work of any commission having charge of tunnel building under the Hudson and Delaware rivers, the development of any port in the state, or any other engineering works of the state. The difficulties attending road building in the Canal Zone, with its heavy daily rains during nine months of the year and extreme dryness during the remaining three months, were very great. Moreover, these roads were frequently subject to very heavy traffic by wagons used in the construction operations. Road building on the water soaked, slippery hillsides, where unceasing teaming made ordinary construction methods impracticable, would have been a sort of continuous nightmare to the highway constructor familiar only with the orderly procedure laid down in the text books.

DOBLE STEAM POWER PLANT FOR TRUCKS.

A special design of the Doble steam power plant is being completed by the General Engineering Co., Detroit, Mich., and will be submitted to the U. S. War Department for tests.

Nothing has been given out as yet considering the details of the new plant, but it is known that the engine is of a very different design than that used in the pleasure car and the weight is entirely supported on the frame. The drive will be through a three-to-one reduction at the differential and a fan will be employed behind the radiator or condenser to insure perfect condensation.

As kerosene is the sole fuel used a saving of at least 25 per cent. is effected and if it is found necessary to burn coal or wood, grates which are carried in the truck body may be used in place of the usual combustion chamber.

WILLYS-OVERLAND WILL MAKE AIRPLANE ENGINES.

The Willys-Overland Co. of Toledo, O., has taken an order for 4500 Curtiss airplane engines. This contract, it is said, will be turned out without interfering with the regular output at the big factory of this company.

DIAMOND JIM BRADY DEAD.

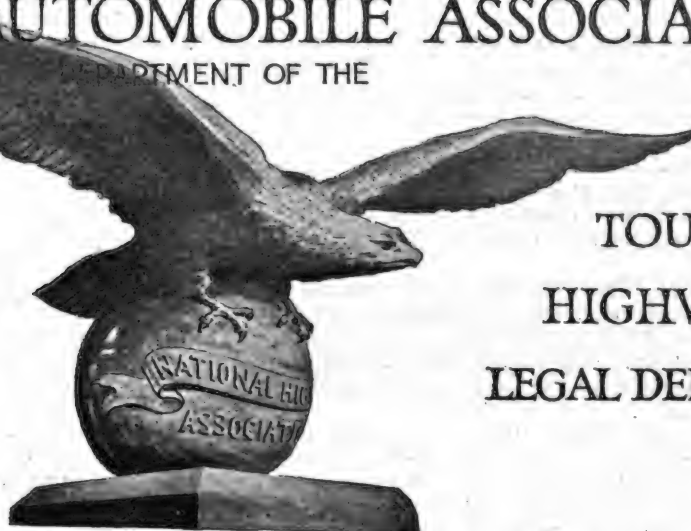
James Buchanan Brady, better known as Diamond Jim Brady, died in Atlantic City on April 13. While not a prominent figure in the automobile business, the big corporation which he controlled, the Standard Steel Car Co. of Pittsburgh, Penn., manufactures the Standard automobile. He started business life as an office boy in the old Grand Central terminal in New York City and was a multimillionaire when he died.

OFFICIAL JOURNAL OF THE NATIONAL AUTOMOBILE ASSOCIATION

DEPARTMENT OF THE

NATIONAL
HIGHWAYS
ASSOCIATION

TOURING
HIGHWAY
LEGAL DEPTS.



9 PARK STREET, BOSTON, MASSACHUSETTS

HIGHWAY MARKINGS IN NEW ENGLAND

MANY inquiries have been received concerning the color schemes of marking routes by colored bands in the various New England states and for the guidance of tourists in New England, we are presenting in this issue a key to routes thus marked.

There is unfortunately a lack of uniformity in the marking of these routes throughout the New England states, owing to the action of individual states. In Massachusetts, however, it was decided to adopt a band of red to mark the main routes running east and west; a band of blue to mark the main routes running north and south, and a band of yellow to indicate all secondary or diagonal routes and where routes crossed each other a band of both were to be used on each post at the junction. If three roads intersected all three colors were to be used. Where two roads followed the same road for a distance bands of both colors were to be painted upon the posts. If the route turns a corner the band shows on the post beyond the turn and there are no bands beyond on the road that the route diverts from. In a few places for short distances three routes will follow one road.

As Vermont and New Hampshire had before Massachusetts marked certain routes by color bands, these states have not conformed to the Massachusetts rule; but where the Massachusetts main routes connect with main routes in New Hampshire and Vermont bands are painted below the bands that were painted on the posts in those states and the Massachusetts colors were painted on a number of posts beyond the line.

Moreover, in Massachusetts, the tourists will find bands of the same colors that have been used over the line in New Hampshire and in Vermont. This indicates to the tourist that the roads are identical and what color he should follow to continue the route. In a large number of towns and cities routes were marked to keep the tourists away from the congested streets and the centre and also to secure better roads, less delay and more important still, to greater lessen the possibility of accidents.

MASSACHUSETTS.

THE following indicate the main routes East and West, North and South, as well as secondary routes:

Main Routes, East and West—Red Routes.

Boston, Worcester, Springfield, Pittsfield, Albany, N. Y.

Boston, Concord, Ayer, Fitchburg, Greenfield, North

Adams, Williamstown, and so on to Troy, N. Y.

Newburyport to Haverhill on the south side of the Merrimac.

Lowell, Lawrence, Haverhill, Salisbury to the beach (a route that will be red when it is completed).

Boston to Plymouth, Sandwich, and the north side of the Cape to Provincetown.

Providence, Fall River, New Bedford, Wareham, here joining a blue route on the south side of the Cape to Falmouth, Barnstable, Dennis, Chatham to Orleans, where it joins the red route to Provincetown in one direction and to Boston and Plymouth in the other.

Main Routes, North and South—Blue Routes.

Boston to New Hampshire and Maine via Lynn, Salem, Ipswich and Newburyport.

Boston to Newburyport via the turnpike.

Boston to Haverhill via Reading and North Andover.

Boston to Lowell, Nashua and Concord, N. H., via Woburn.

Boston to Brockton, Middleboro, Wareham and all points on the south shore of Cape Cod.

Boston to Providence, R. I., via Dedham, Wrentham and North Attleboro.

Fitchburg, via Worcester and Webster, to Putnam and New London, Conn.

Brattleboro, Vt., via Greenfield, North Hampton, Holyoke, Springfield, to Hartford, Conn.

Bennington, Vt., via North Adams, Pittsfield, Great Barrington to New York.

Secondary Routes—Yellow.

Pittsfield to North Hampton, via Dalton and Goshen.

Worcester to Athol, via Rutland and Barre.

Fitchburg to Keene, N. H., via Ashburnham and Winchendon to Fitzwilliam, N. H.

Worcester to Providence, via Northbridge, Blackstone, Woonsocket, R. I.

Littleton to Lowell, via Westford and Chelmsford.

Lawrence to Salem, via Middleton.

NEW HAMPSHIRE.

FOLLOWING is an outline of the color scheme as followed out in the State of New Hampshire, together with the application made on the several roads designated:

State Aid Roads—Black.

Merrimack Valley Road—Blue.
 East Side Road—Yellow.
 West Side Road—Blue.
 South Side Road—Purple.
 Whittier Road—Two Red Stripes.
 State Roads—Black and White Checks.

WEST SIDE ROAD—Blue bands with white border—From the Massachusetts state line south of Hinsdale through Keene, Newport, Lebanon, Hanover, Twin Mountain and Whitefield to Colebrook.

MERRIMACK VALLEY ROAD—Green bands with white border—From the Massachusetts state line in Nashua through Manchester, Concord, Laconia, Plymouth and Franconia Notch to the West Side Road at Twin Mountain.

EAST SIDE ROAD—Yellow bands with black border—From the Massachusetts state line in Seabrook, over the Ocean Boulevard in Hampton and Rye to Portsmouth, through Dover, Rochester, Tamworth, Jackson, Pinkham Notch, Gorham, Berlin and Dixville Notch to the West Side Road at Colebrook.

SOUTH SIDE ROAD—Brown bands with white border—From the Vermont state line near Bellows Falls, Vermont, through Alstead, and Acworth to the West Side Road, north of Marlow, then follows the West Side Road south to Keene, then through Dublin, Peterborough, Wilton and Milford to the Merrimack Valley Road in Nashua, then follows the Merrimack Valley Road north to Manchester, then through Candia, Raymond, Epping, Exeter to Portsmouth.

WHITTIER ROAD—White bands with red border—From the Merrimack Valley Road in Meredith through Moultonborough and Tamworth to the East Side Road in Ossipee.

CRAWFORD NOTCH ROAD—Red bands with white border—From the West Side Road at Twin Mountain through Crawford Notch to the East Side Road in Bartlett.

CENTRAL ROAD—White bands with black border—From Claremont to Concord and thence to Rochester and Dover.

SUNAPEE LAKE ROAD—Black bands with white border—From the Central Road in Sunapee through New London, Bristol and Hebron to the Moosilauke Road in Plymouth.

MOOSILAUKE ROAD—White bands with red border—From the Merrimack Valley Road in Plymouth through Rumney, Warren, Benton and Pike to the West Side Road in Haverhill.

MASCOMA VALLEY ROAD—Green and blue bands with white border—From the Merrimack Valley Road in Franklin through Andover, Canaan and Enfield to the West Side Road in Lebanon.

WINNIPESAUKEE ROAD—Gray bands with black border—From the Merrimack Valley Road in Lakeport through Alton and Farmington to the East Side Road in Rochester.

CONTOOCOOK VALLEY ROAD—Gray bands with white border—From the Massachusetts state line in Rindge through East Jaffrey, Peterborough, Hancock, Antrim, Hillsborough and Henniker to the Central Road in Hopkinton.

GORHAM HILL ROAD—Blue and yellow bands with white and black border—From the East Side Road in Gorham through Randolph and Jefferson to the West Side Road in Lancaster.

FRANCONIA ROAD—Orange bands with black border—From the Waterford Bridge in Littleton through Bethlehem to the Merrimack Valley Road in Franconia.

SUNCOOK VALLEY ROAD—Green and yellow bands with white and black border—From the East Side Road in Ossipee through Wolfeboro, Alton, Barnstead and Epsom to the Merrimack Valley Road at Suncook.

MONADNOCK ROAD—Orange bands with black border—From the South Side Road in Keene through Troy and Fitzwilliam to the Massachusetts state line.

HUDSON-DERRY ROAD—Green and orange bands with white border—From the Merrimack River in Hud-

son, opposite Nashua, through Londonderry to Derry Village.

RAYMOND-PLAISTOW ROAD—Black bands with white border—From the South Side Road in Raymond through Kingston and East Kingston to the Massachusetts state line in Plaistow.

ROCKINGHAM ROAD—Orange bands with white border—From the Merrimack Valley Road in Manchester through Derry to the Massachusetts line at Salem.

WILSON ROAD—From the Windsor Bridge to the Plainfield line.

LAFAYETTE ROAD—From the junction of the E. S. T. L. in Hampton, through North Hampton, Rye, Portsmouth.

RHODE ISLAND.

IN THE State of Rhode Island there are red, blue and yellow routes, as outlined below:

Red Routes.

Clarksville to Providence.

State line to S. Foster to Providence.

State line to Greene, Washington to Centerville to Providence to Narragansett Pier.

Westerly to Wakefield to Narragansett Pier, north to Wickford, to Providence.

Blue Routes.

Attleboro, Mass., to Pawtucket to Providence.

Providence to Bristol to Newport.

Providence to Centerville.

Yellow Routes.

Woonsocket to Pawtucket.

Providence to Seekonk.

Warren to Fall River, Mass.

Wickford to Wakefield.

CONNECTICUT.

AS FOR the State of Connecticut, the differentiation in arrangement is to be seen in the subjoined paragraphs:

Primary Routes—North and South—Blue.

Primary Routes—East and West—Red.

Secondary or Diagonal Routes—Yellow.

Primary Junction—Blue, with Red Fork.

Primary and Secondary Junction—Red with Yellow Fork.

Double Primary and Secondary Junction—Red and Blue Cross with Yellow Fork.

PRIMARY ROUTES—BLUE ROUTES.

Salisbury to Sharon.

Winsted, Torrington, Litchfield, Milford, Brookfield, Danbury, Norwalk.

Torrington, Thomaston, Waterbury, Naugatuck, Beacon Falls, Seymour, Ansonia, Stratford.

Framington, Plainville, Southington, Cheshire, New Haven.

Suffield, Windsor Locks, Windsor, Hartford, Berlin, Meriden, Wallingford, New Haven.

Enfield, East Windsor, South Windsor, Hartford, Wethersfield, Rocky Hill, Cromwell, Middletown, Durham. Middletown, Chester, Saybrook, Essex, Old Saybrook. Summers, Vernon, Manchester.

Stafford, W. Willington, S. Willington, Windham, Franklin, Norwich, Montville, New London.

Brandy Hill, Thompson, Putnam, Killingly, Plainfield, Lisbon, Norwich.

Yellow Routes.

Salisbury, Canaan, Norfolk, Winsted, Cherrybrook, Canton, Hartford.

Derby to New Haven.

New Haven, Northfield, Durham Centre.

Connecticut Red Routes.

Port Chester, N. Y., Stamford, Norwalk, Southport, Bridgeport, Stratford, Milford, New Haven, Gifford, East River, Saybrook, Waterford, New London, Groton, Stonington to Westerly, R. I.

Danbury, Southbury, Waterbury, Meriden, Middletown. Thomaston, New Britain, Hartford.

Farmington, Hartford, Manchester, Willimantic.

Thompsonville, Hazardsville, Somerville, Stafford Springs.

National Progress in Scientific Highway Construction

Errors of Management in America and Problems Raised by the Automobile Emphasize Engineering Needs, Even on Earth Roads

By Stanley E. Bates, S. B.

TARDY DEVELOPMENT OF THE SCIENCE OF HIGHWAY CONSTRUCTION

Although roads of some kind must necessarily have been the earliest known means of communication and commerce between primitive peoples, the application of scientific principles to their design and construction has been of comparatively modern origin. Even at the present day it cannot be said that the science of road building has reached as advanced a stage of development as the far more recently introduced railroad, telegraph or steam navigation. This is particularly true in America.

If we neglect the celebrated Roman military roads, which, because of their great thickness and their consequent enormous labor—cost of construction, can scarcely be called scientifically built, the first engineers to make an extensive study of the fundamental principles of road construction were Tresaguet and McAdam, only a little over a century ago. The principles laid down by these two pioneers in the movement for good roads have been found to produce such an excellent road surface for a comparatively heavy traffic that wherever macadam roads have been built these principles have been followed to the present day with little change, except as influenced by the inventions of the stone crusher and the road roller.

On the other hand a good surface is not the only requirement for a good road and, furthermore, in this country macadam roads, although common, constitute less than three per cent. of the total road mileage, owing to the comparatively high cost of construction. In addition to this the majority of people in this country until very recently have considered road building in general as a matter requiring very little application of scientific principles. A road, no doubt, appeared to be a very common, ordinary kind of structure and not worthy of much forethought, or expense in its design, either as to grades and alignment or to drainage and surfacing. The enormous benefits of good roads were little appreciated.

PAST ERRORS OF ROAD MANAGEMENT IN AMERICA

Under the system of land office surveys the roads of a large portion of the West were laid out on a checkerboard system following the section lines, North, South, East and West, no matter whether these lines led over lakes, swamps or mountains. Moreover, this system never could furnish the most direct means of communication between any towns, unless they happened to lie on the same meridian or parallel of latitude. But, worse than this, the improvement and maintenance of roads all over the country were left largely to the farmers living along the line. This statutory road labor, by which the farmer was compelled to spend two or three days out of the year in working on the road without even the most elementary knowledge of the principles of road construction, has fortunately been abolished in a large number of our states. Gradually there has been an awakening not only to the need of good roads in this country, but also to the fact that millions of dollars are being wasted every year in having untrained men direct the work of highway improvement.

We are coming to understand that dependence upon scientific principles is as necessary in the construction of even our earth roads as in the construction of the great bridges, buildings and machinery which mark the progress of our civilization and prosperity.

STATE HIGHWAYS AND THEIR EFFECT UPON ROAD CONSTRUCTION.

Going back again into history: In the year 1892 the State of Massachusetts passed a law creating a state highway commission. With the exception of the old

"National Pike" this was the first instance in this country where a larger unit than a county took charge of public road construction and marks the beginning of the new awakening. The state, having jurisdiction over a much longer mileage of roads than any one county and also having a greater fund of money at its disposal, could and did employ engineers, chemists, geologists and other trained men in the work of designing roads and road surfaces, as well as making tests upon various road materials.

One by one other states followed the example of Massachusetts, until today such a commission exists in almost every state of the Union. All of these state highway commissions are adding greatly to the store of scientific knowledge in both their construction and investigation work.

CHANGES BROUGHT ABOUT BY THE AUTOMOBILE.

During the period that this change was taking place in road management there was another evolution in progress, which has had a vital influence upon the road question and has created an additional demand for scientific men. This was the introduction and very rapid development of the motor car. On roads where automobile traffic was very heavy the kind of construction perfected by Tresaguet and McAdam was found to go to pieces very rapidly, and this has led to the necessity of employing other materials, and often a heavier construction, to take care of these new conditions. Thus there has sprung up the use of bituminous wearing surfaces, as well as brick, concrete and numerous other materials, many of them protected by patents. With the use of all of these various materials the science of chemistry has come to have a most important bearing on road construction.

The effect of the growing demand for trained highway engineers, geologists and chemists is reflected by the large number of universities and scientific schools which recently have added special courses leading to a master's or doctor's degree. Highway engineering is fast becoming a separate and distinct science, and will soon take its place on an equal footing with the other great branches of engineering, such as civil, mechanical, electrical and sanitary.

But the greatest service to be rendered by the scientist to the cause of good roads is still in the future. We are now on the verge of still another era in the progress of highway construction—an era which promises to bring this branch of engineering practice to a much higher degree of perfection.

NATIONAL HIGHWAYS WILL EFFECT STILL GREATER PROGRESS

The cause of good roads in this country has come to be a national concern. As a result of the great awakening to the need of improved roads, indications point clearly to the early establishment of a national highway commission, just as they did 25 years ago to state highway commissions. It is beyond question that in the very near future our national government will undertake the construction of a system of national highways throughout the country. And just as state highway commissions, by employing trained men to direct their highway construction, brought about radical improvements in the methods of construction, even so will national highways bring still greater improvement.

There are now over 2,000,000 miles of unimproved roads in this country. It cannot be expected that the government will itself undertake the immediate improvement of all these roads, but it is certain that the government must lead the way. The expenditures necessary to improve all of these roads will be enormous, and, therefore, it will be the work of the government highway engineers and scientists to devise methods of building highways more economically and with better surfaces for the future to an ever increasing degree.

Legal Papers and Decisions for Motorists

No Changes in Canada in Automobile Tourist Regulations Since Last Year—Breach of Warranty Decision—New Laws

Compiled by N. A. A. General Counsel

FOR the information of motorists contemplating touring into Canada, it may be said that there has been no change in the automobile tourist regulations since last year. Tourists to Canada for no longer period than 30 days are required to call at the Custom House at the point of entry for inspection and to receive a 30-day permit. Those wishing to remain in Canada longer than 30 days are required to bond their cars for 85 per cent. of their value and to obtain a permit for six months. Bonds are sold in all large cities and the usual charge is \$5. When a tourist leaves Canada he should have his permit cancelled by the collector of customs.

BREACH OF WARRANTY.

A DECISION of interest to many motor car buyers has just been handed down by the Supreme Judicial Court of Massachusetts in a suit to recover the purchase price paid for an automobile for alleged breach of warranty.

It appeared that the plaintiff bought a ——— automobile for which he paid \$600. A written agreement was executed. An action was brought to recover for the breach of an oral warranty made during the negotiations resulting in the sale, that the automobile could be operated 12 miles on a gallon of gasoline. On cross-examination of the plaintiff, when the written contract for the first time appeared in evidence, he testified that when it was delivered he inquired concerning the warranty; thereupon the defendant wrote what appears on the agreement in pencil, namely: "Guaranty as to parts same as with a new car." "I asked him to give me the guarantee that went with a new car. If that is the guarantee that goes with a new car I got all I asked for." He also testified that he did not know what the defendant wrote. In the Superior Court the verdict was for the plaintiff.

The court held that when it is apparent that the writing contains only a part of the agreement and does not purport to set forth all its terms, or when it is a reasonable inference that it was not intended to be a full and final statement of the entire transaction, the existence of a separate agreement, not inconsistent with its terms and relating to some subject on which the written instrument is silent, may be shown by parol. But where a writing shows on its face that it includes the whole agreement of the parties and comprises all that is necessary to constitute a contract, it is presumed that they have placed the terms of their bargain in this form to prevent misunderstanding and dispute, intending it to be a complete and final statement of the whole transaction. And all their stipulations relating to its subject matter are to be found within the written instrument.

The rule forbidding the introduction of parol testimony to vary or contradict a written agreement is not merely one of evidence, though commonly, perhaps, so spoken of, but one of substantive law, and rests on the doctrine that when parties have deliberately put their agreements in the form of a written contract they shall not be allowed to show that the agreement was something else. By deciding to put in writing all their promises, they made the writing the sole record of their agreement; they agreed to this by the execution of the contract. Its terms and conditions, therefore, must be sought in the instrument wherein they are recorded; to modify, enlarge or contradict them, would violate the substantive rights of the parties. The instrument was complete in itself. It showed on its face that it denoted a complete legal obligation and contained all the conditions of the contract; it gave the name of the buyer and of the seller, the make and kind of automobile, the price paid, the acknowledgment of payment and the specific warranty "as to parts same with a new car." In view of this it is necessary to consider the testimony of the plaintiff and what inferences, if any, were to be

drawn from it, showing his acceptance of the writing as a final and complete account of the agreement.

Although the plaintiff testified he did not know what defendant wrote when the addition in pencil was made, there was no fraud practised upon him. He accepted the instrument as a final statement definitely fixing the terms of the agreement; and even if he did not sign it, no question under the statute of frauds arising, he is bound by it.

There are no obscure words in the document requiring explanation, and oral evidence cannot be resorted to for this purpose.

An express warranty, which is an affirmation of fact inducing the sale cannot be added to the written agreement, under the rule permitting an agreement by parol, which is collateral to the contract and on a distinct subject, to be proved. If the terms of the sale are in writing, extrinsic evidence of an expressed warranty not referred to in the writing is not admissible, subject of course to the exception that the document is not a mere bill of parcels or other imperfect and incomplete record of the agreement. It is also to be mentioned that the contract was not silent on the question of warranting the automobile. When some particular subject is dealt with in the writing it is presumed that the complete engagement on that subject is contained in the written contract. When the plaintiff asked for a warranty, one was inserted. "By requiring a warranty he is to be understood as accepting against all terms by such as are stipulated in the bargain." The contract expressly provided that "guarantee as to parts same as with a new car" and an additional warranty guaranteeing the extent of the consumption of gasoline in its operation, could not be added by parol.

As there was no breach of the written agreement and it could not be changed by parol, the court ordered judgment for the defendant.

INSURANCE OR MOTOR BONDS.

THE public sentiment in evidence at the beginning of the 1917 sessions of the legislatures of the New England states, relative to irresponsible owners of motor vehicles in using highways, which was referred to in the Feb. 10 issue of this journal, has already borne fruit in Massachusetts to the extent of the enactment of a law directing the Massachusetts Highway Commission to inquire into the subject of damages to persons and property by accidents caused by owners and operators of motor vehicles. The commission is authorized to consider methods of protecting persons against such damage and also of indemnifying them. Public hearings upon the subject shall be held by the commission and the commission is ordered to make a report to the general court on or before the first Wednesday of January, 1918, with drafts of such proposed legislation as it may deem expedient.

RESPONSIBILITY OF A MINOR.

IN A Michigan case a guardian consented to the purchase of an automobile by his minor ward and furnished the money to pay for it from the ward's estate. In an action brought to recover the price of the automobile the court held that the contract did not bind the minor upon reaching his majority. A minor, may, upon becoming of age, disaffirm his purchase of the automobile, and upon tendering back the machine may recover the money paid for it regardless of the way which he has driven it.

CARELESS OPERATING OF AUTOMOBILE.

IN VERMONT a motorist was charged with carelessly operating an automobile upon a public highway. He demurred to the complaint on the ground that it did not suf-

(Continued on Page 47.)

**GASOLINE STRAINER.**

(Figure 353.)

Dirt, sand or water are not uncommon things to find in gasoline, yet it is aggravating to find the presence of such impurities by the carburetor method. If it is possible to remove them before they reach the carburetor then much time and patience may be saved. A cheap, but serviceable filter is shown herewith. It is made of pipe fittings and a small piece of copper gauze and assembled as follows: Cut a $4\frac{1}{4}$ inch circular piece of copper gauze into halves, and, after bringing the sides together, solder them so as to form a cone, as shown in the illustration. This cone is next soldered to a copper wire ring the same size in diameter as the pipe nipple D. The pipe nipple should be made of $1\frac{1}{2}$ inch brass pipe about three or four inches long. Screw the pipe nipple into the cap F, with the copper gauze ring between, being careful to make up the joint tightly by using soap or shellac. After this is done bore and tap the hole for the pipe, A ($\frac{1}{8}$ inch pipe), also the hole for the drain cock. Fill with gasoline so as to be sure that the joints are tight. If it is found that they are, put on the cap, E, which has been tapped for the pipe assembly, B. Connect A with the gasoline tank, B, with the carburetor. Note that the pipe, A, extends into the gauze funnel. This apparatus effectually separates water or dirt from the gasoline.

FORD HEADLIGHT CONTROL.

(Figure 354.)

Everyone knows just what happens when the Ford car engine is running slowly on high speed. The headlights do not furnish such a bright driving light as is given when the engine is running at full speed. Quite frequently it is necessary to drive through bad roads where the car speed does not exceed eight miles per hour for half an hour at a time. It is then that full light is most necessary, but not obtainable with the present wiring. We give a suggestion for rewiring the Ford car in such a way that this annoyance may be minimized. A, B and C are the three points of an ordinary switch, D is the magneto terminal. The insert E shows the switch bar, which swings on C, and the method of soldering a cross bar so that A and B may be connected at the same time. With the switch covering A and B a concen-

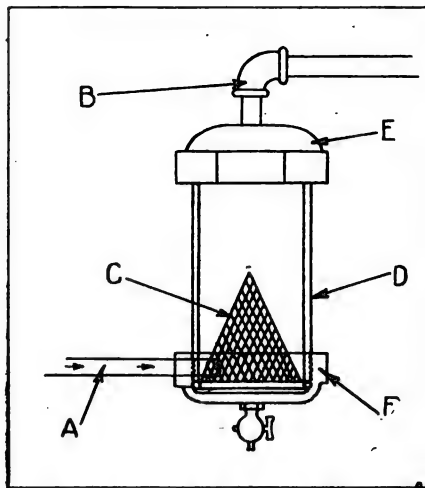


Fig. 353—Gasoline Strainer.

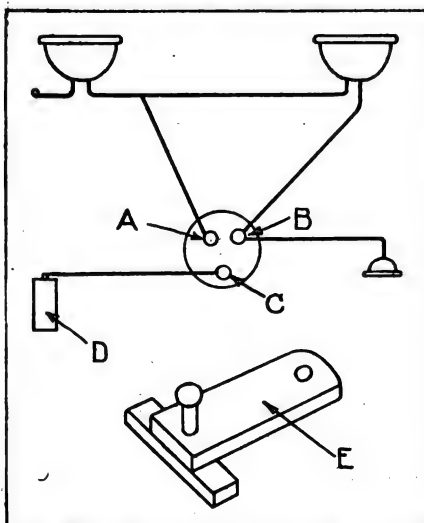


Fig. 354—Wiring for Ford Car Lights.

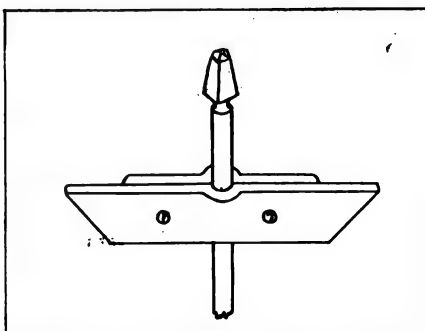


Fig. 355—Valve Reseater.

trated light is obtained in the left headlight. With the switch thrown to B only both headlights are lighted. Care should be observed not to run with the engine speeded up and only one light burning, as the light bulb will be burned out.

VALVE RESEATER.

(Figure 355.)

By constant regrinding the valve seats often become so worn and grooved that the valves seat so deeply as to permit only a small opening and a consequent loss of power. When this results the valves should be replaced by larger ones and the valve seats recut to a larger diameter. The illustration shows an easily constructed valve reseating device. The cutter blade is made from a flat piece of tool steel, fitted with a strap for holding it to an old twist drill, and with its edges cut to an angle of 45 degrees. The shank of the drill should be left long enough so as to extend down through the valve guides, and large enough to fit and form a centre for the cutting tool. The construction is clearly shown in the illustration.

FORD ACCESSORIES.

Many people do not realize the value of Ford car accessories, or their application upon cars other than the Ford. This field is constantly growing, new accessories and equipment are being regularly added. Then, too, the prices on this class are within reason. Motorists should not despair, then, if they are unable to obtain just the thing they want made especially for their car. They should look among the Ford accessories, and it is very possible that just the right thing may be found, or at least may be adapted to the need.

MUDGUARD DENTS.

(Figure 356.)

Unightly dents in mudguards detract from the beauty of the car as well as the enjoyment of riding. If one has ever tried to hammer out the dents or bends with an iron hammer against a piece of wood, one will appreciate the fact that such a procedure is not practical, as not only the surface finish is removed, but also a certain stretch of the metal, buckling or warping ensue. Two methods are illustrated, either of which has proven effectual. The first shown at A is the

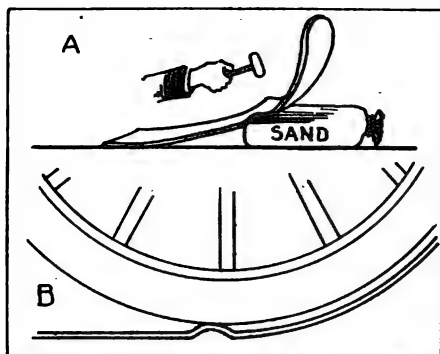


Fig. 356—Removing Dents from Mudguards.

mallet sand bag method. The advantage that this method has over the hammer board method is that the mudguard finish is not removed from the soft contact with the sand bag, and the dent may be easily pounded out, without stretching the metal. The method shown at B is very effectual for large bends or dents. By this method the bend is removed by the pressure of the tire and wheel supporting the car, as there is no hammering effect, the metal is not warped or distorted in the least. Badly dented mudguards are often straightened by either of these methods and made as good as new.

WINDSHIELD WIPER.

(Figure 357.)

Many accidents on rainy or foggy days are caused by moisture collecting upon the windshield and obscuring the view of the operator. There is no excuse for this when a windshield wiper may be constructed as cheaply as is shown in the cut.

Upon a piece of flat board tack a length of rubber such as a strip cut from an inner tube, bend it at right angles to the board and fasten it in that position by a thin wood cleat on the back as shown. On one end of the board screw a block through which has been bored a hole just large enough to slip easily over the windshield binding. From this hole to the edge a slot is cut to allow space for the glass. When put into place the rubber strip should press lightly against the outside of the windshield glass, and this when moved from side to side removes all moisture from the outside of the windshield. The apparatus may be mounted either on the top as shown, or the side of the windshield, as is most convenient.

OIL GAUGE.

(Figure 358.)

A number of the older cars still in use are not equipped with oil gauges for indicating the amount of oil in the base of the engine. Practically the only way of keeping sufficiently lubricated on such a car is to open the upper petcock in the engine base and pour in oil until it runs from this opening. When the device illustrated is installed, however, the operator is kept informed as to the condition without crawling beneath the car. It is easily constructed from pipe fittings and a short length of boiler gauge glass.

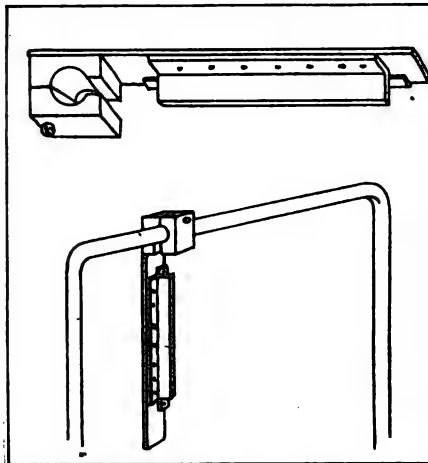


Fig. 357—Windshield Wiper.

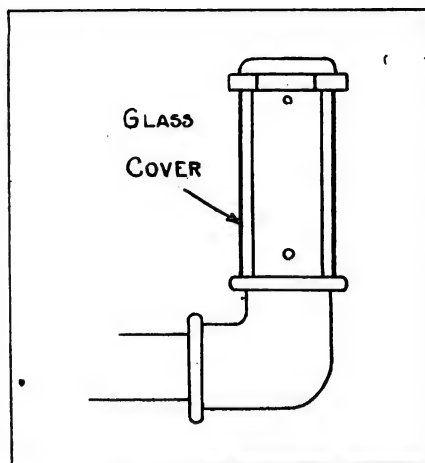


Fig. 358—Oil Gauge.

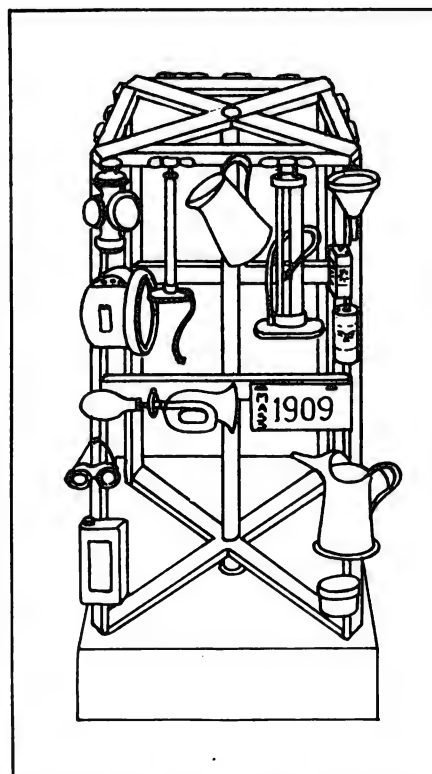


Fig. 359—An Easily Constructed Silent Salesman.

The fittings necessary are a $\frac{1}{4}$ inch pipe cap, a pipe nipple $\frac{1}{8}$ by six inches, an elbow and a short length of pipe for connecting with the crank case. The construction is clearly illustrated. The gauge glass is clamped between the elbow and cap, over the pipe nipple. In the pipe nipple there should be bored two holes to admit the oil into the chamber between the glass and pipe. It may be found necessary to bore a very small hole in the pipe cap to let out the air, but not large enough to allow the oil to escape. The centre of the glass indicator should be mounted about on a level with the proper height of the oil in the base of the engine.

HOME MADE BUMPER.

(Figure 360.)

We give herewith a suggestion for a home-made bumper which may be easily constructed from pieces of pipe and springs. This is designed to be applied to the spring clips, or springs on the front of the car, and by its use the car is kept from being marred by collisions with buildings, other cars and the like. As the illustration is self-explanatory, we will not go into the details of construction. The cost should not be great, but the benefit derived may be of much value.

THE SILENT SALESMAN.

(Figure 359.)

The silent salesman idea is more applicable to the accessory dealer perhaps than any other line of business. A customer upon entering the sales room immediately looks around for displays of tools, accessories, etc. If the salesman are busy and he does not see such an exhibit, a certain amount of time is wasted. He may go into the place with the idea of purchasing a horn and if he sees a pump exhibited he is reminded of the fact that he needs just such an article. The illustration gives a suggestion for such a display stand, easily constructed and effectual. The greater the variety of exhibits the greater its value as a salesman. Such an article may have even greater value than a show case.

If you are not fortunate enough to own a full set of socket wrenches you should break off about a half dozen short lengths of old hack saw blades. The length of the pieces depends upon the depth of your available socket wrench. When using them they should be placed alongside the nut and the socket placed over them.

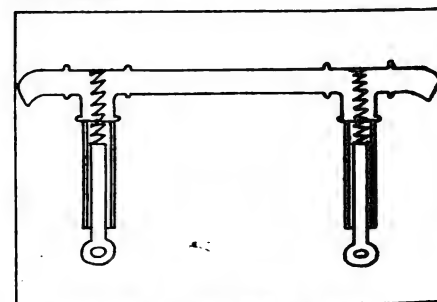


Fig. 360—Home Made Bumper.



Accessories and Equipment



TITANIC SPRINGS.

Few people realize the extreme importance of the automobile spring. It must be strong enough to withstand road shocks, yet flexible enough to permit of easy riding. The spring illustrated is the result of expert designing. The feature being the absence of weakening holes. This spring is strengthened instead of weakened by being reinforced with a patented arch and attached with a clamp entirely outside the spring. Quick service is claimed by the manufacturers who keep a large stock room full of ready-to-ship springs for practically every make of standard cars. Distributing stations are established in all the large cities throughout the country. These springs are guaranteed forever against centre breakage, and for one year against any breakage at all.

Manufactured by Tuthill Spring Co., 760 Polk St., Chicago, Ill. Prices and catalogue upon request.

KANT-LEEK WASHERS.

Grease and dirt upon hubs and wheels, old rotted tires and inefficient brakes, are results of oil leakage from the rear axle of an automobile. Kant-Leek Washers for Ford cars are made to remedy grease and oil leakage from the rear axle. These washers are easy to apply and require no adjustment once they are put into place.

Manufactured by Kant-Leek Mfg. Co., St. Louis, Mo. Distributed by Harry Becker, room 306 Monroe Bldg., 104 S. Michigan Ave., Chicago, Ill. Price, 90 cents per set of four. Special proposition for dealers.

THE THERMOMAT.

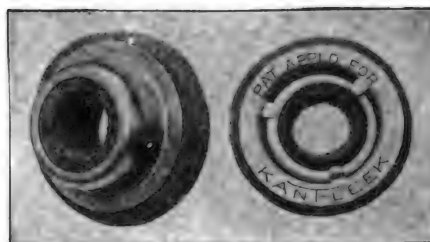
With a car cooled by the Thermo-Syphon system the efficiency of the system is dependent upon proper circulation. Should steam pressure develop, the efficiency is materially decreased at times and the temperature of the engine immediately increases, often with disastrous results. The Thermomat is said to eliminate any possible chance for steam pressure to develop. It consists of a tank or vacuum chamber designed to be attached in the fore door of the car, with two pipes to connect it with the engine water circuit. The upper tube leads from the engine water outlet through the dash into the top of the vacuum condenser tank. The lower tube passes from the water space or bottom of the vacuum tank through the floor board to the en-



Titanic Spring.



Acme Automobile Jack.



Kant-Leek Washer.



It's It Electric Vulcanizer.



Application of the Thermomat.

gine water inlet elbow. The position of the tank is such that when the radiator is full the tank is a little over half full of water. As long as the engine is cool the condenser does not operate, but when the water begins to boil the condenser takes up its work and operates as fast as steam is generated.

Manufactured by the Cawle Co., 506 City Trust Bldg., Indianapolis, Ind. Price, \$12.50.

"IT'S IT" ELECTRIC VULCANIZER.

"It's It" is the name applied to a new portable electric tube vulcanizer recently placed on the market. It can be used either from the battery current or connected with the electric system on a Ford when the engine is running. It consumes about as much current as one headlight when in operation and is very safe, there being no open flame to blow out or flicker with the resulting uncertain heat. Any novice can use the device with assurance of a good job in 10 minutes.

Manufactured by the Premier Electric Co., Ravenswood, Chicago. Price, \$1.50 complete.

ACME AUTOMOBILE JACK.

Aside from the fact that it is simple in construction and may be operated from the end of the longest car, without soiling the clothes, the outstanding features of this jack are ball thrust bearings and large base area. All working parts are enclosed in a dirt and grit tight housing, and run in heavy grease. The lift screw is $\frac{7}{8}$ inch in diameter, four threads per inch and provided with a nut of government bronze.

Manufactured by I. S. Spencer's Sons, Inc., Guilford, Conn. Price, \$6.50.

BEN AUTOMOBILE JACK.

Operating upon ball bearings which carry the entire weight of lifting, the Ben automobile jack is something novel in its line. It is operated by turning a folding handle to either the right or left, which acts upon a spiral screw engaging with dogs on the lifting bar through a gear and pinion. All of the working parts are enclosed in a solid, water proof outer case, packed in grease to insure perfect lubrication, and fully protected from dampness, dirt and dust.

Manufactured by Wagner-Hoyt Electric Co., 1902 Broadway, New York, N. Y. Price, \$6 each.



Climax Cantilever Absorber.

BUTLER SEMI-CAST PISTON.

The constant endeavor in all lines of manufacturing, designing and construction work is to get maximum strength and endurance with minimum weight. This is especially true of the reciprocating parts of the automobile engine. The piston illustrated is the result of considerable study by experts who have made a specialty of engine work. It is made of special fine grade gray iron. A narrow rib supports the head and a light wall construction with heavier bosses help create a tendency for the metal to draw in over the piston pin rather than to expand and cause scoring. Each piston is designed and cast to best meet the needs of the engine in which it is to be used. In connection with their light weight, high efficiency piston, this firm also specializes in cylinder grinding and the making of standard cast iron pistons, pins and rings.

Manufactured by Butler Mfg. Co., Indianapolis, Ind. Prices upon request.

TOLIVER TUBES.

Motorists who have had many a pleasure spin marred by puncture troubles will be interested in the Toliver puncture-proof tube, which is guaranteed for 5000 miles without a puncture. It is made the same as any extra high grade tube and is inflated with air in the usual way, but the secret Toliver process makes it puncture proof. It is claimed that many users get as high as 12,000 miles service without a puncture.

Manufactured by the Toliver Tube and Tire Co., Denver, Col. Details and prices upon request.

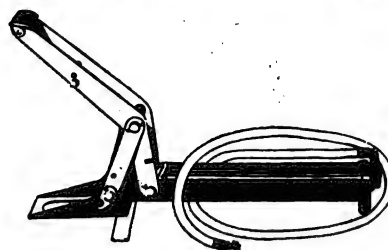
MALTBY SPRAY PRIMER.

A compact little device made of brass with which the manufacturers claim a gasoline engine may be started in "zero" weather is known as the Maltby spray primer. The primer may be attached to the manifold of any car, installed either through the radiator in hand cranked cars or through the dash in cars equipped with engine starters. The action of the primer is: A charge of gasoline is drawn into the primer by the pump action and injected into the intake manifold in the form of an atomized vapor.

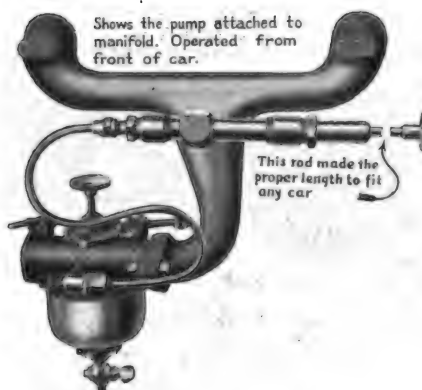
Manufactured by Maltby Auto Specialty Co., Battle Creek, Mich. Retail price, \$7.50. Special discount to dealers.



Toliver Tube.



Twombly Tire Foot Pump.



Maltby Spray Primer.



View and Part Cross Sectional Cut of Butler Semi-Cast Piston.

CLIMAX CANTILEVER ABSORBERS.

It is a well established fact that a set of shock absorbers increase the riding qualities of any car, regardless of make, eliminating vibration, side sway, broken springs, excessive tire wear and smooth out the rough roads. The Climax Shock Absorber herewith illustrated is designed to fit any make of car, and is designed on the principle of compound cantilever action. They are so fitted that they yield to the smaller jolts and shocks, preventing them from reaching the body of the car, that otherwise would be transmitted through the springs, which are designed to withstand maximum strain. They can be adjusted to suit different loads or road conditions by turning the coiled springs by hand.

Manufactured by the Climax Shock Absorber Co., Benton Harbor, Mich. Price, \$25 a pair.

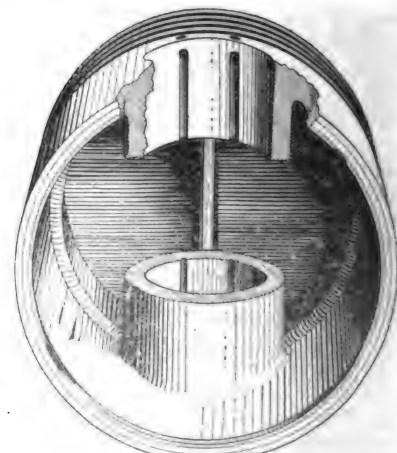
TWOMBLY TIRE FOOT PUMP.

A new way of pumping tires is introduced by the Twombly tire foot pump. As is indicated by the name, the pump is designed to be operated by foot pressure, or what amounts to the same thing, the weight of the body. To operate it is only necessary to place the ball of the foot on the lever and step downward. The spring brings the lever up again. This is said to be essentially a high pressure pump, as the matter of pumping from 70 to 80 pounds pressure is as easy as raising the pressure to 40 pounds. One of the features claimed is its compactness, being only 17 inches long, three inches high and three inches wide.

Manufactured by Schlesinger-Redburn Corp., and marketed by Abbott Motor Equipment Co., Broadway and 59th street, New York City.

RESISTOIL AIR HOSE.

An important item both about the automobile and the garage is the air hose. Rubber is very susceptible to compressed air and oil fumes and becomes porous after a period of use from friction and impurities of the air passing through it. The Resistoil hose in outward appear-



ance is very much like any five-ply air hose, but the real value and wearing qualities is in the inner tube and the special construction of the outer walls. This hose is designed to stand the wear and overcome the sources of annoyance to every user of compressed air.

Manufactured by Brunner Manufacturing Co., Utica, N. Y. Prices from 16 to 27 cents per foot according to size.

"CASH REGISTER" CONTACT PARTS.

The "Cash Register" of contact parts, which has been placed on the market to facilitate the handling of contact parts by dealers is a neat cabinet, seven inches high by 10½ inches wide by 14¼ inches long and contains four drawers, each having 19 compartments. Each compartment is labeled as to its contents, making it easy for the dealer to place his hand on any part without delay and also enabling him to keep track of his stock and to tell at a glance what he is short of and prevents over stocking of parts.

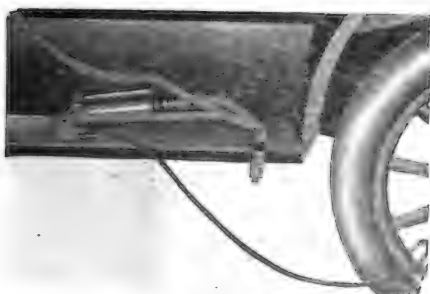
The assortment that it contains is arranged so that a full set of contact parts can be supplied for any one of 66 different makes of cars. The dealer has the privilege of exchanging the parts that do not sell readily for others for which there is a big demand. The "cash register" is given free with a purchase of parts totaling \$109.16, retail price, subject to dealer's discount.

Made by Paul G. Niehoff & Co., Inc., 350 N. Clark St., Chicago, Ill.

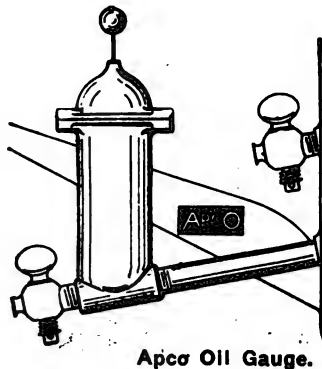
"OFF-AND-ON" TIRE TOOL.

A tool for removing and applying plain and demountable clincher tires to automobile rims, that will eliminate much of the arduous and unpleasant labor connected with either operation is a boon to motorists. The inventors of the "Off-and-On" tire tool seem to have come pretty close to solving the problem and have at least made tire changing a much more pleasant task through the use of this instrument than when considerable brawn and effort was required to accomplish the same end. The tool is in two pieces and of odd and unusual shape. It is so applied that the weight of the wheel when swung around supplies most of the effort necessary in removing the tire or replacing it.

Manufactured by the New Era Spring and Specialty Co., Detroit, Mich. Price \$1 complete.



Geneva Tire Pump.



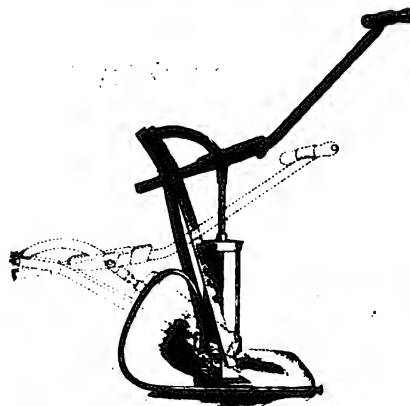
Apco Oil Gauge.



Off-and-On Tire Tool.



Pail and Funnel.



Jensen Tire Pump.



Tow Chain.



Mirror.

NEW APCO PRODUCTS.

Three new specialties for the Ford car have recently been put on the market and are shown in the illustration.

One of these is an all-metal oil gauge intended to be attached to the crank case. The height of the lubricant in the case is indicated by a white ball, which is attached to a float inside the gauge. The usual draining petcock may be screwed into the gauge. The finish is black enamel.

The Apco rear view mirror differs somewhat from the conventional type in that it is attached to the windshield supporting bracket by a screw instead of a clamp. The mirror glass is spun into the frame, 5½ inches in diameter of the reducing type. Finish is in black enamel.

The tow chain illustrated, the makers claim, is capable of supporting a strain in excess of 2900 pounds. The links are treated with a special material to make them rust proof. The chain, which weighs but four pounds, comes in a neat canvas bag.

Manufactured by the Auto Parts Co., Providence, R. I. Prices: Oil gauge, 50 cents; mirror, \$1; tow chain, \$2.50.

JENSEN FOLDING TIRE PUMP.

The Jensen tire pump is constructed on a principle of compound lever action, which makes it easy to operate and produces 90 pounds pressure with very little effort on the part of the operator.

The Geneva lever tire pump, which is also illustrated, is built on the same principle as the Jensen, but has fittings for clamping it onto either running board.

Manufactured by the W. H. Howell Co., Geneva, Ill. The price of each pump is \$5, fitted with eight feet of hose. With pressure gauge, \$6.25.

PAIL AND FUNNEL.

The Faultless pail and funnel is designed to fill the demand for an easily carried radiator filler. It is a combination of funnel and pail, made of heavy water proof army duck with a galvanized hoop in the top and non-rustable valve in the bottom. A pull on the string releases the valve in the bottom, allowing the water to flow through the small outlet tube.

When not in use the combination may be folded up and occupies but very small space in the tool kit.

Manufactured by National Manufacturing Co., Des Moines, Iowa. Price, \$1.

Comforts for Autoist and Tourist Camper

Shelters, Storage and Cooking Devices of Every Handy Sort
Insure the Motor Trip will be a Dream of Gilded Pleasure

SPRING is here again and with the coming of this welcome visitor those fortunate ones who are happy in the possession of an automobile begin to think of the country, the fresh air in the open and the hardships mixed with the joys of camping. Many are the accessories manufactured for the camping autoist, his every wish is anticipated and every comfort giving device is provided.

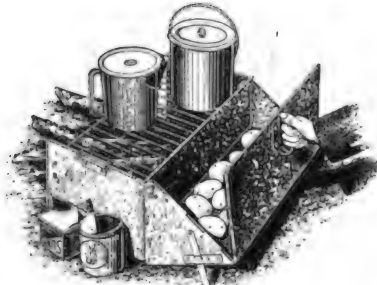
A shelter for the car, as well as the occupants, is provided for in the Des Moines touring tent, made by Des Moines Tent and Awning Company of Des Moines, Iowa. This tent is made of the very best sail drill with the genuine government khaki treatment, and the makers guarantee it to be mildew proof and water repellant. It is light in weight in proportion to its size, for example, the Ford car is 11 feet "over all" and the size tent used for this car will fold into a bundle about 12 inches in diameter and 24 inches long, weighing less than 25 pounds. A tent for this car sells for \$30. For each additional foot in length the extra cost is \$2 per foot. A double tent is obtainable. By this is meant a tent applied to each side of the car, giving twice the camping space at an extra cost of one-third the cost of the regular tent of corresponding size additional.

It frequently happens that for the shorter tours a tent is not desirable, and if the size of the car permits it is possible to obtain beds which may be placed in the car itself, thus affording sleeping accommodations without the bother of pitching a tent. Such an article is sold by the Peoria Auto-Kot Co. of Peoria, Ill. The frame is made of ½-inch galvanized tubing, braced in two places to hold it rigid. The covering is of heavy ducking laced on the under side. It is six feet long by two feet wide and hinged in the middle. When complete it weighs less than 15 pounds. Two of these cots can be placed side by side in practically any touring car. When folded the kot is two by three feet and fits in the tonneau, out of the way.

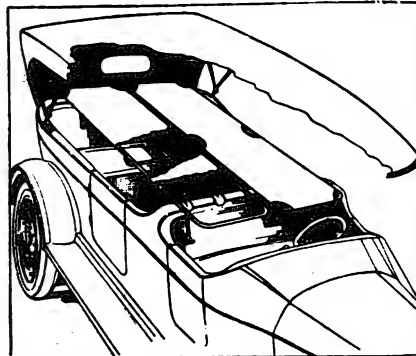
Although there is a certain amount of enjoyment in "roughing it," the addition of a few accessories for camp life are sure to increase the pleasure and diminish the actual work. A camp fire is a mighty pleasant and practical thing if the builder is accustomed to this sort of work.



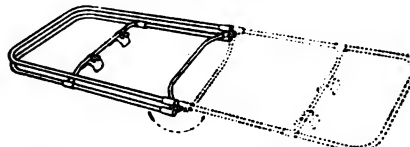
Moats Folding Gasoline Stove
Number Two.



The Red-E Stove with Broiler and
Oven Attached—Utilizing Any
Length of Fire Wood.



Showing Two Peoria Auto-Kots in a
Touring Car.



Peoria Auto-Kot Frame, Showing
Method of Folding Same for Stowing.



Globe Refrigerator Box Type D.



Globe Refrigerator Box Type A.

The Red-E stove with broiler and oven attached, made by the Red-E Co., of Durham, N. H., is a practical and efficient device for preparing good meals out of doors. The stove is made for service. The grate is of steel, each grate bar being welded to the rim iron, which in turn is welded into a continuous piece. The bars are spaced close together so that things cannot drop through. The back and ends of the stove are heavy gauge galvanized iron, wire bound throughout. The hinges and handles are double riveted, no solder being used in the construction. When folded the stove is less than one inch thick, 10 inches wide by 18 inches long.

The oven is amply large enough to take a good sized roast. The top is hinged to the back edge, so that it can be opened without disturbing the stove proper. When folded the dimensions are but 18 by 10 by ½ inches.

Another handy stove combination is furnished by Prentiss-Wabers Mfg. Co. of Grand Rapids, Wis. This stove, however, is designed to use gasoline as a fuel. It has two six-inch grates and tank of sufficient capacity to last 2½ hours. The full equipment consists of coffee pot, two fry pans, one each sugar and coffee retainers, pressure pump and funnel. All the equipment may be packed inside the stove as illustrated, for transportation.

For short, one-day trips it is often desirable to pack food and ice into convenient retainers, rather than to rely upon faith for sustenance.

A practical refrigerator designed for automobile tourists is made by the Globe Machine and Stamping Co. of Cleveland, O. This refrigerator box is made of steel and contains one compartment for ice, one for food and racks for bottles.

The water tight compartment for ice will hold 25 pounds. There is an insulation of asbestos between the heavy galvanized iron lining and the outer steel box, and a small tube with a removable plug serves to drain the ice water, or retain it for radiator supply when touring. The food compartment is placed over the ice chamber, while the bottle rack is placed beside it. All the compartments are covered by a wire screen upon which may be carried plates, knives and forks, napkins, etc.



A Des Moines Touring Tent.

Comet Six Makes Its Bow; Has A Lewis Engine

IN A market which is already beginning to talk about a prospective shortage of high class motor cars before the spring touring season gets fairly under way, the arrival of a new car is of more than ordinary significance. One of the cars which is making its debut at this opportune time is the Comet Six, a car of quality, which is being brought out by the Comet Automobile Co. of Decatur, Ill., of which corporation George W. Jagers is president and general manager, and G. Vernon Beck is vice president and general sales manager. The motor used is the Lewis six-cylinder en bloc, a power plant produced by the Lewis Motor Corp. of Detroit, and one which attracts no little attention at this time in the motor world. It is announced that the price of the car, which combines may new and standard features of mechanical efficiency, with beauty of lines and body finish, will be priced at \$1285.

Unbroken lines in entire harmony from the radiator to the rear seat mark the pleasing streamline body, which is of the double cowl type, and high body sides add further to an opulence of appearance which is strongly supplemented in high quality upholstery, bright finish and equipment features. The radiator pan and side skirts completely close up the bottom and sides, thus affording passengers ample protection from mud and dirt. The body colors are maroon and blue, with black enameled radiator, fenders, hood and skirts, and yellow wheels.

The engine is of the L head type, with a bore of 3 3/8 inches and a stroke of five inches, having an S. A. E. rating of 27 2/5 horsepower. At the normal speed of 2500 revolutions per minute it develops 50 horsepower.

Cast in one block with the upper part of the crank case the cylinders are very compact and fully water jacketed. Detachable heads afford easy access



The Comet Six, Showing 125-Inch Wheelbase, High Sides and Long Running Board—Car Is Priced at \$1285.

to the interior of the explosion chamber, as well as to the valves.

An "inherently balanced" crankshaft, two inches in diameter, is rigidly supported upon three long bearings. The timing gears are spiral cut with a face of 1 1/4 inches.

All valves and push rods are completely enclosed so that the engine presents a clean and smooth appearance. The valves, which are 1 1/4 inches in diameter, with a lift of 5/16 inch, give ample gas inlet and exhaust opening.

Lubrication is accomplished by the combination force feed and splash system. A pump in the three-gallon oil base of the engine forces oil through concealed leads inside the crank case to the bearings and thence to individual constant level troughs for each crank.

A thermo-syphon cooling system is used, employing a large cellular radiator and a ball bearing fan driven by belt from the camshaft. The water jackets of the engine are large and efficient. A feature being the cored passages for water on the valve side of the head, as well as on the opposite side, thus overcoming the difficulties caused by distorted valves and seats from uneven cooling.

A combination type of intake and exhaust manifold, by which it is claimed the fuel is thoroughly broken up and enters the cylinders in a dry gas, is used.

Ribs on the side provide a large area for cooling the exhaust gases. Ignition current is furnished by a Delco distributor and coil, together with a six-volt, 100 ampere-hour storage battery. A multiple disc, dry plate, steel on raybestos clutch, transmits the power to the transmission gearset, which is of the selective, sliding gear type, three speeds forward and reverse and forms a unit with the engine. A full floating, short propeller type, rear axle is fitted with Hyatt hi-duty and Bock taper roller bearings. Drive and pinion gears are spiral cut with a ratio of 4 1/2 to one.

Easy riding qualities are insured by the use of semi-elliptic, two by 36-inch front and cantilever 2 1/2 by 50-inch rear springs. The wheels are of the artillery type, 12 spoke, high grade hickory, fitted with demountable rims and 33 by four-inch tires. The steering gear is mounted on the left side of the car and acts through worm and worm gear with ample adjustments for wear.

Included in the equipment are the slanting, rain vision windshield, one-man top of rainproof material, with jiffy curtains and slip cover.

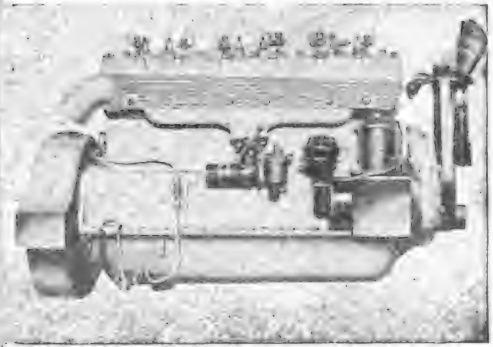
The standard equipment includes headlights with dimmers, cowl light, tail light, windshield searchlight and trouble light, electric motor driven horn, locking switch, Stewart-Warner speedometer, ammeter, robe and foot rails, jack, tire pump and tire tools, hup cap wrench and tool kit.



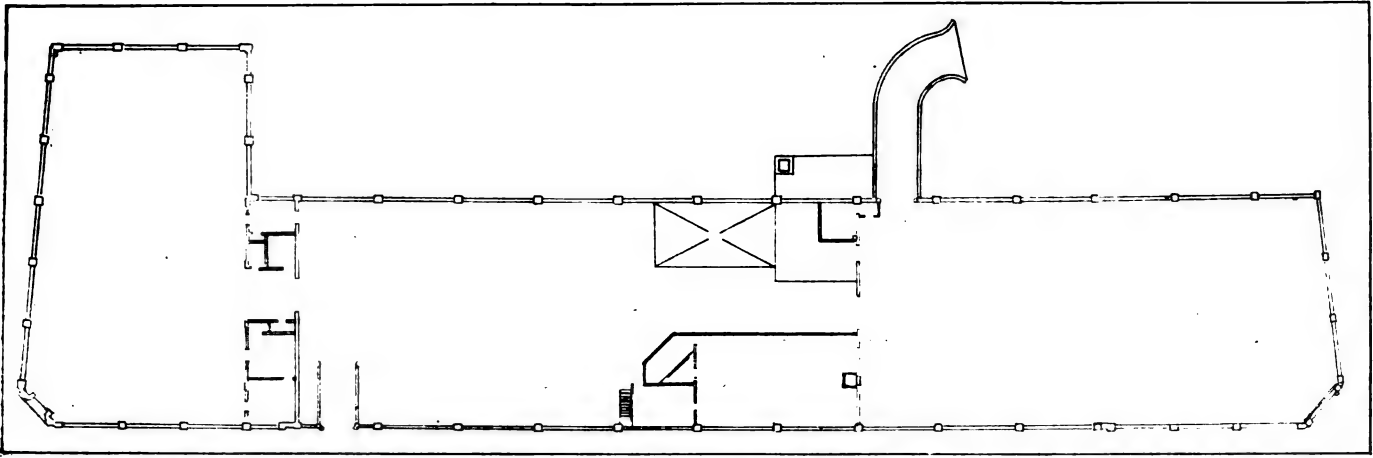
Front of Lewis Engine with Three-Blade Double-Bladed Fan.



The Comet Six Head-on View.



Right Side Lewis Unit Type Engine with Bell Housing Inclosing Flywheel.



Plan of the Main Floor of the Packard Service Station at Worcester, Mass., the Headhouse Being the Salesroom, and in Order from Left to Right the Offices, Garage, Battery Room, Stock Room, Accessory Store, Washstand, Lavatories and Repair Shop.

feet four inches wide at the narrowest end and 69 feet at the widest, with a total area of about 7540 square feet. Behind the headhouse the building extends back 325 feet. The first 15 feet of the depth for the entire width of the building where it joins with the headhouse is devoted to the offices of the manager, assistants, clerical force and the lavatories. For a distance of 165 feet eight inches back of the offices the space is occupied by the garage and the remaining 144 feet nine inches houses the repair shop. The office and entrance to the garage occupies about 1050 square feet, the garage 11,520 square feet and the repair shop 10,150 square feet. On the floor below the repair shop there is a used car storage room which has an area of 10,150 square feet, making the total floor area of the building approximately 40,510 square feet, not including the boiler room and coal pocket, which is on a level with the storage room floor.

A door at the corner of Shrewsbury and Aitchison streets leads into the pleasure car sales room, which has

neither posts or floor obstructions of any kind to mar its spacious appearance or convenience in handling the cars. The woodwork is quartered oak paneling and the plaster is buff tinted. Quarter oak is also used on the woodwork in the offices with marble trimmings.

The garage is reached by a ramp from Aitchison street. A stock room, battery room and accessory store is located in the garage. The accessory store, which will carry a large stock of accessories, will be open at all convenient hours so that customers' needs may be filled.

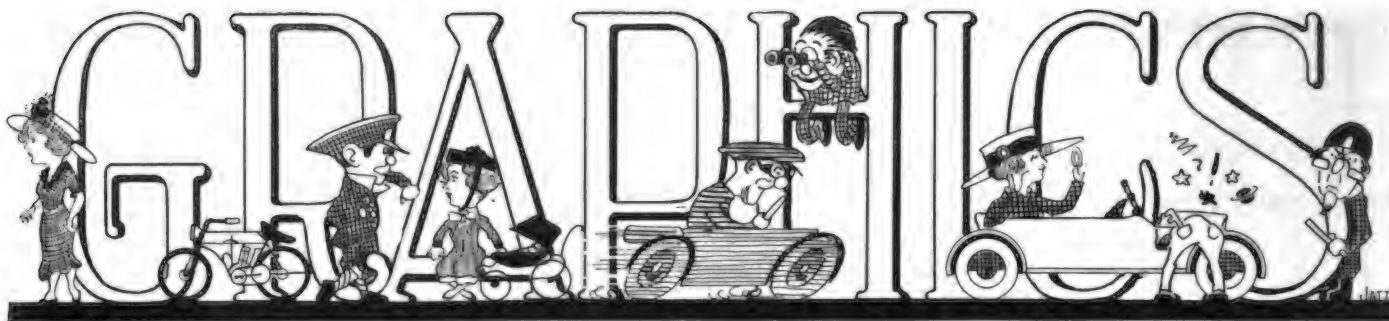
In the service department the same principles of operation are followed out as in the main plant at Boston. Every

customer is cared for with the idea of keeping him satisfied and giving him the highest grade of service and work at normal cost. There are three records used in passing work through the service department. A clerk fills out an order, entering every detail when a machine is taken into the shop to be repaired or adjusted. When employee starts to work on the car he enters the time on a work ticket or time card, which is stamped mornings, noons and nights until the employee or employees turn it over as finished. When material or parts are required in the work they are obtained from the store room on blanks that are signed by the workman and service superintendent. With this system the job can be checked when finished and the customer can learn just how much work was required in fixing his car and what materials were necessary.

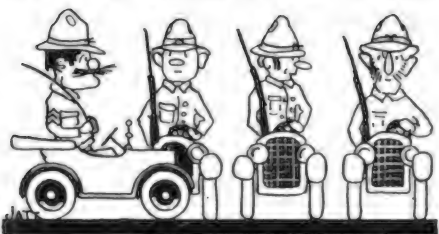
William A. Harris is in charge of the truck sales at the branch under Mr. Allen and Ray F. Frizzelle is in charge of the service department.



The Main Floors of the Service Station: Above, Department for the Storage of Used Vehicles Under the Repair Shop; at Left, Looking from the Entrance to the Garage Through the Repair Shop; at Right, Looking from the Repair Shop Through the Garage and Sales Room.



The Light Brigade that made the famous charge at Waterloo, Mosby's Guerrillas in the Civil War and Roosevelt's Rough Riders in the Spanish War will shine with less brilliancy from the pages of history if the Fliver Brigades that are now being organized in many cities ever



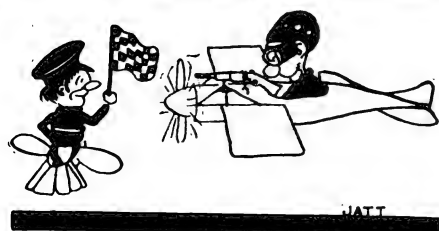
get into action in our present war and live up to expectations. With a few additions and expurgations of the manual of arms they are capable of enacting manouvers that for speed and flexibility would put to shame their progenitors who went into the fray on their hay motors.

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When the bill was introduced into the Maine Legislature to amend the state highway law, compelling all vehicles to carry a light, a clause exempting those vehicles carrying hay precipitated considerable debate. One member in commenting upon this clause in the bill, and in search of a reason why the exception was desired, said that it might eventually prove effective if no other excuse for its existence could be found, by administering a severe shock without serious results to the careless motorists and speed maniacs who in their zeal to burn off the covers of the country roads came to grief with their legs sticking out of a load of hay which they were unable to detect in their path through the absence of any warning light.

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The "Aerial Sharpshooters" is the proposed name of a military aviation unit to be composed of aviators that have previously distinguished themselves as racing drivers on the American speedways. De Lloyd Thompson, the well known aviator, who is organizing the unit, says



that five of the 15 fastest drivers in the world have accepted his invitation to join. These are Eddie Rickenbacher, Earl Cooper, Joe Thomas, George Hill and Eddie Pullen.

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There is plenty of evidence at hand of the rapidly increasing use of motor cars by people in all walks in life, but little is known of the extent to which owners use their machines in traveling about the country. In relation to this question the observations of a Maine hotel man are interesting. He says that more than 80 per cent. of his guests last season came by automobile from 31 states, Canada and New Brunswick. Despite this indication of the great volume of travel by automobiles last year the railroads reported record breaking traffic on their lines.

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There are automobile speed kings, holders of motor endurance records, non-stop run champions and a dozen other varieties of performers that have won



fame and medals for making their cars do phenomenal stunts, but it remained for Abraham Toube to distinguish himself as the champion all around reverse-gear pilot. Arriving at Needles, Arizona, with his car, en route for the Pacific Coast, he stripped his low, second and high gears. A condition of impecuniosity preventing their replacement, he threw into reverse, backed around in the direction that he had formerly been pointing and drove on reverse gear into Los Angeles, Cal., a distance of 315 miles. He was accompanied on the trip by his wife and eight other members of the immediate Toube family.

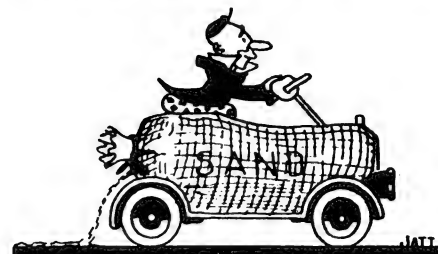
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Two big spotlights set on neighboring buildings played on the national emblem when an imposing American flag was raised to the peak of a pole 125 feet high in Brockton, Mass., on "loyalty night" recently. The parade was featured by men from the Sterling motor car factory, which has been making munitions for Russia and is now prepared to turn out 1,000,000 one-pound shells for

the United States. Behind them was a big motor truck loaded with these shells. Roars of applause marked every step of the journey.

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Down in Wacross, "Joja," as they



speak of it in the South, the motorists will hereafter combine serviceable effort in behalf of good roads with their weekly touring trips. The automobile club of that city has provided a big pile of bags of sand that are kept at the club house and whenever a member starts on a trip he is invited to take along several of these to be used in filling holes in the roads whenever they are found of such depth as would be dangerous to traffic.

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An automobile club secretary at Hartford, Conn., made a wing-footed record when a colonel of infantry telephoned that it was desired to transport a company of men to guard the big bridge at Warehouse Point. In less than two hours private motors had been collected and the men put down on the spot, and their supplies, transported on a light truck, were there soon after.

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A motorist is known by the colors he carries. The Stars and Stripes is the prevailing pennant. It is seen singly and in many attractive arrangements everywhere.

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The automobile dealers and garage-men in San Antonio, Tex., are causing some dark clouds to gather about the expectations of the local motorists who look forward to long Sabbath tours. These tradesmen decided to close shop on Sundays on the principle of "I should



worry, we will get the business on Monday just the same."

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The use of automobiles in Denmark has been temporarily prohibited by the Danish government, owing to the scarcity of fuel and motor supplies. Gasoline is selling around a dollar in Denmark and owing to the British embargo on motor cars and supplies prices on tires and other things are very high.

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Out in Oklahoma farmers have devised



a system of placing their plows before their machines instead of dragging. This enables the driver to gauge accurately just where the furrows are being turned up, and he incidentally enjoys the pleasure of a deeply upholstered seat instead of treading along in the rut left by a seven-inch share.

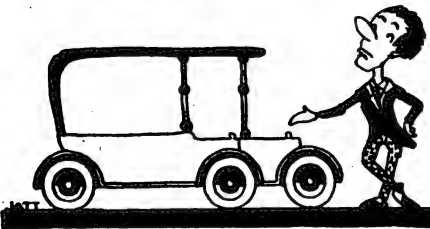
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Figures compiled by the National Highways Protective Society show that 25 persons were killed by automobiles in the streets of New York City during March. Four persons were killed by trolley cars and eight by wagons in the same period. During the same period in 1916 22 were killed by motor cars, six by trolley cars and one by wagon.

Since the first of the year 61 persons have been killed in New York City by automobiles; 26 by trolley cars and 15 by wagons.

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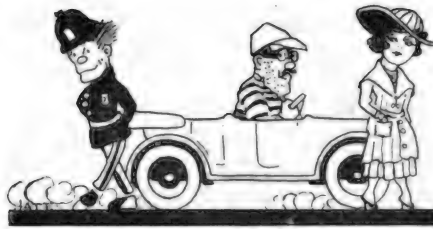
Charles Snyder of Little Rock, Ark., is building an eight-cylinder Ford car. He has put two Ford engines end to end, with one crank case, which is as long



as the average man. Mr. Snyder is spending \$1200 on his experiment.

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The first statistics on speed violations compiled in New York by Magistrate Frederick B. House of the Traffic Court show that from June 14, 1916, when the court was opened, until Dec. 29 last, he heard 2746 speed cases. Of these 673 were caught on Fifth avenue, and of the 673, 222 were caught between Washington square and Twenty-third street and 63 between Twenty-third and Forty-second streets, 331 between Fifty-ninth and 110th streets. On Riverside drive 439 were arrested and 313 were taken on Broadway.



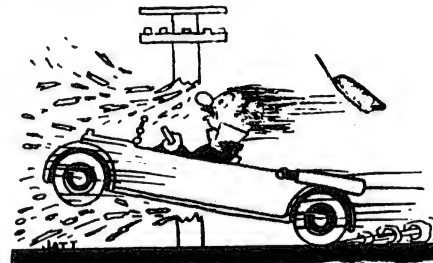
Despite the utmost vigilance, a crafty thief will get away with an automobile from some parking places, in daylight, every once in a while. Sometimes it happens that the cop is making a sparking place of the parking place, and sometimes his attention is simply distracted by the passing of a decoy charmer whose partner rides silently away while she intercepts his ardent glances.

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An automobile which was built in Germany for Emperor William and which was sent to London just before the war to be fitted with a special body, has been sold for \$35,000 to a Danish ship owner. The body builders applied to the courts for permission to sell the car and their request was granted.

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"Flivver Jim the Human Buzz Saw" recently torpedoed a telephone pole amidships near Sunbury, Penn. The



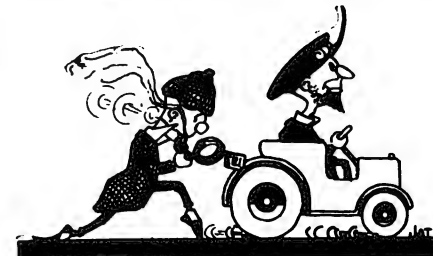
blow was so great a piece of the pole two feet long was knocked out, the pole dropped down and still in an upright position met its new level minus the piece that was knocked out.

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The Massachusetts House of Representatives killed the bill modifying the conditions under which a man may operate a motor car, owing to the general belief that the measure was designed to afford leniency to drunken automobile drivers. The present law reads: "Under the influence of liquor," as indicating the condition of a man who is legally barred from driving a car in the Bay State. In the proposed bill the following phrase had been substituted: "While in an intoxicated condition or while incapable of operating such a vehicle with safety to himself or the public because of his use of any intoxicating liquor or drug."

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In New York state the official inspect-



ors who have charge of prosecuting motorists evading the provisions of the state vehicle law, have been instructed to be particularly vigilant this year. Special instructions have been issued to apprehend persons using commercial cars with pleasure car licensing plates.

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One glance into a certain auto repair shop in Boston would convince the most skeptical person that the millennium had arrived as his gaze would rest upon femininity engaged in the unusual task of



mussing with the mechanism of motor cars with their fair skin smeared with oil, grease, grime and other substances not conducive to pulchritudiness. They are mastering the intricacies of the motor and transmissions. One sees bloomers stretched out on a mucky floor beneath the chassis, trying to put on a right handed bolt by turning it to the left and hears additions to an already highly stocked vocabulary of anethema.

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Stone Mountain, outside of the city of Atlanta, Ga., where Gutzom Borglum, the famous sculptor will carve the gigantic memorial to the leaders and soldiers of the Confederacy, is one of the most popular spots for tourists in the South. A resident recently made a tally and it was as follows: 1308 automobiles, 62 motorcycles, 11 bicycles and 228 horse drawn vehicles. He also counted 327 people that climbed the mountain afoot.

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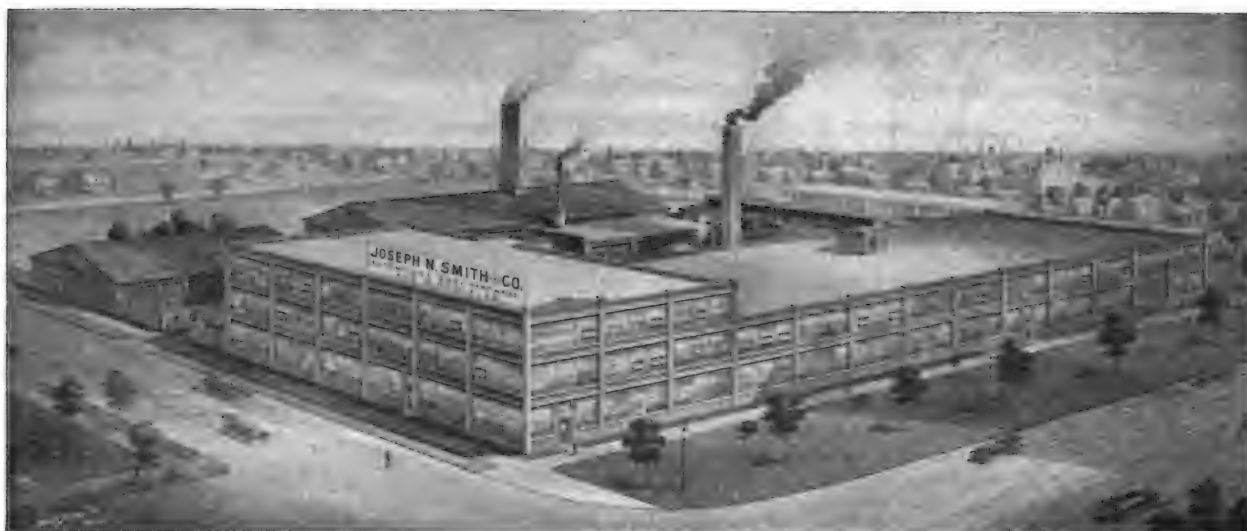
Down in Waco, Tex., the automobile dealers are doing such a rushing business that even the newspaper reporters have to rush alongside of them while they are demonstrating, if the scribes wish to secure an interview. One of the



local papers there came close to losing a perfectly good reporter when he was sent out to interview one of the car distributors, as while he was waiting to get a word with him the dealer made several sales and not even free publicity would tempt him to stop.

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Jauntily and without affecting the pleasure of the family comfortably grouped in the car, the auto trailer appears on Sunday drives on Massachusetts state roads. One coming out of Fitchburg last Sunday drew an empty trailer, eloquent of the fact that it was wanted for business on the Worcester end of the ride Monday morning.



New Daylight Factory of Joseph N. Smith & Co., Detroit, Mich., Makers of Automobile Body Hardware and Mountings, Doubles Output Capacity.

The Business Side of the Motor Vehicle Industry

Joseph N. Smith & Co., manufacturers of automobile body hardware, announce the occupation of their new factory at East Grand boulevard and DuBois street, Detroit, Mich. The plant comprises over 77,000 square feet of floor space, offering an opportunity for more than doubling the company's output and greatly increasing the force of 350 people employed in the old factory. The plant includes a complete brass foundry, japanning department, tumbling department, polishing department, grinding department, heat treating department, press department, windshield department, plating department, molding department, tool room, machine room, assembly room and a large stock warehouse and shipping room.

W. C. Goodchild has been appointed state manager of New Hampshire for Metz cars by the Metz Co. of Waltham, Mass. He will have headquarters at Manchester and will have entire charge of the dealers throughout the territory. The Metz company has announced as new prices on its models \$650 and \$695.

L. Cotter McHugh of the automobile spring department of the Detroit Steel Products Co., has left for Camp Borden, Canada, where he will be attached to the Royal Flying Corps. After three months training there he will be transferred to England, where he will undergo three months additional training before going to France for active service.

The Manly Motor Corp. has moved its offices to the plant at Waukegan, Ill. The offices were formerly maintained at 1438 Michigan avenue, Chicago, Ill.

B. C. Dowse, formerly president and general manager of the Federal Rubber Mfg. Co. of Milwaukee, and some of his associates, have formed the Dowse Rubber Co., with an authorized capital stock of \$2,500,000, of which \$1,000,000 is cumulative seven per cent. preferred stock and \$1,500,000 common stock. Negotiations are pending for the purchase of two factories now making automobile and other pneumatic tires and mechanical goods, one of the factories being in Chicago, where headquarters of the Dowse Rubber Co. will be established.

J. D. Hopper, service manager of the Remy Electric Co., has completed arrangements for the opening of a new Remy service branch in Denver, Col. It will be located at 846 Broadway, in that city.

The Springfield Body Corp.'s new plant at Detroit, Mich., will be equipped throughout with motor driven machinery. Every wood and metal working machine in the new factory will receive its power

from a separate motor. The building will soon be finished and a force of 500 men will handle the production, which is to be conducted on a schedule of one Springfield type body every 20 minutes. There are 6471 windows in addition to numerous skylights in the building, together with a complete Cooper-Hewitt lighting system.

The Revere Motor Car Co., Logansport, Ind., is building an addition to its plant in that city which will increase the production facilities far beyond what was at first contemplated. The additional floor space provided will enable an output of 2500 cars annually.

The Stanley Motor Carriage Co., Wilmington, Del., has filed articles of incorporation at Dover with a capital of \$13,000,000. The company will manufacture automobiles, tires, tubes and motor accessories.

The Empire Automobile Co., Indianapolis, Ind., has announced a new price schedule on the model 70 light six, which is an advance of \$50 over the present price and which becomes effective on May 1.

The Clark Equipment Co., Buchanan, Mich., has started work on a new wheel shop, which will increase the present wheel capacity approximately 50 per cent. The new building will be 180 feet long by 60 feet wide and will be equipped with the most modern machines for production of steel wheels for motor trucks. An addition is also being made to the equipment in the steel foundry to take care of the increased machining capacity. When all the improvements have been completed the factory will have a production of approximately 100 wheels per day.

The Parry Mfg. Co., Indianapolis, Ind., makers of commercial bodies for Fords, Maxwells and other light chassis, last month shipped a large number of commercial bodies for Maxwell cars to Buenos Ayres and also several dozen one-man tops for Ford touring cars to Valparaiso, Chile. Shipments to Cuba are also being made on a regular weekly schedule.

The Packard Motor Car Co., Detroit, Mich., has declared a dividend of two per cent. to the holders of common stock as of record on April 16.

The Prest-O-Lite Co., Inc., has appointed the following battery service stations: City Garage, Adrian, Mich.; G. G. Hadlock, Lucas, Kan.; Phillips Hardware Co., Cambridge, Md.; Manley Bros., Brattleboro, Vt.; Charleston Welding Works, Charleston, S. C.; J. E. Barry, Henry, Ill.; Roy Moorman Service System, El Centro, Cal.; Central Electric Co., 128 S. Main street, South Bend, Ind.; Schlageter &

Meacham, Streator, Ill.; Electro Mechanical Specialty Co., 247 S. Broadway, Yonkers, N. Y.; Mitchell Battery and Tire Co., 217 W. First avenue, Mitchell, S. D.; I. G. Dillon, 200 Rock Island street, E. Reno, Okla.; Geo. A. Bees, Marshalltown, Ia.; Hogeboom & Thompson, 1214 S. Main street, Goodland, Kan.; Ed. Foust, Marion, Ind.; Northwest Garage, Cherokee, Ia.; Ream Garage, Broken Bow, Neb.; Emenaker Elec. Co., 121 W. La Porte street, Plymouth, Ind.; Washtenaw Electric Shop, Inc., 200 East Washington street, Ann Arbor, Mich.; Obye & Safey, Rockwell City, Ia.; The Battery Service Station, 56 River street, Elgin, Ill.; Charles F. Schafer, 114 E. Third street, Alliance, Neb.; Rummell's Garage and Auto Service Co., 117-19 Sandusky street, Findlay, O.

Richard Everett, formerly sales manager of the Raybestos Co., has joined the sales organization of the Standard Woven Fabric Co., and will have charge of the jobbing business in Multibestos brake lining and other products manufactured by the company for the automobile trade.

The Harroun Motors Corp., Detroit, Mich., has elected the following directors: John G. Monihan, former vice president of the Marmon Motor Car Co.; Ray Harroun, former chief engineer of the Marmon and Maxwell companies; Lewis H. Rogers, formerly assistant general manager of the Brush Electric Co.; George C. Worthley, former president and treasurer of the Fairbanks Co.; John J. Plath, former sales manager of the Maxwell Motor Co.; Paul H. Bruske, former advertising executive of the Studebaker and Maxwell companies; R. Ward Macey, Jr., former sales executive of the Ford, Franklin and Premier companies; F. A. Vollbrecht, president of the Neville Steering Wheel Co., and former general manager of the King Motor Car Co.; George F. Monihan.

Alfred Reeke has formed the Alfred Reeke Co., which will occupy the Jeffery branch house at 455-459 Broadway, Milwaukee, together with the Nash Sales Co. The Reeke company will handle Jeffery trucks in Wisconsin and upper Michigan and the Jeffery passenger car in Milwaukee county. The Nash company handles the Jeffery passenger car in the middle and northwestern territory.

The General Engineering Co., Detroit, Mich., makers of the Doble cars, have received orders for 5390 and a deposit has been received with each. The total business represented is \$10,106,250.

The Jones Motor Car Co., Wichita, Kan., has instituted a new dealers' magazine, which is entitled "Jones Crest." In the second issue President J. J. Jones de-

scribes the 1917 model Jones five-passenger roadster, which is termed "America's Most Practical Roadster."

The Thibert Manufacturing Co. of Worcester, Mass., has been incorporated under the laws of that state with a capital of \$50,000 to manufacture automobiles and accessories. An issue of 5000 shares of common stock in the company at \$10 a share has been authorized.

James E. Morgan, secretary and treasurer of the Wallace E. Hood Service Bureau of Detroit, and **Henry G. Moesta**, special representative of the bureau, have joined the colors and are now on duty somewhere in the middle west. Mr. Morgan, who is one of the well known executives in the industry, is a member of the first division of the Michigan Naval Volunteers and Mr. Moesta is in the Sixth division.

The Brown-Hare-Parsons Co., 580 Woodward avenue, Detroit, Mich., have been appointed distributors for Disco two-unit starting and lighting systems in Michigan and several other states. The Disco Starter Corp. has a well equipped plant with a capacity of many thousands of units annually. The new type of Disco is of the four-pole type of construction, being cylindrical in shape, five inches in diameter and approximately $7\frac{1}{4}$ inches in length.

The Briscoe Motor Corp., Jackson, Mich.,



B. C. Dowse, Head of Newly Formed Dowse Rubber Co., Which Will Have Headquarters in Chicago.

announces that on May 1 the various Briscoe models supplied on the model B4-24 chassis will be advanced \$40. The new prices will be: \$725 for the touring, roadster and runabout models, as well as the canopy top delivery wagon, and the panel body will sell for \$750. Prices are f. o. b. Jackson, Mich.

The Duesenberg Motors Corp., Edgewater, N. J., has started production on airplane and automobile engines at the plant in that city, which was recently taken over.

W. B. Jameson has been appointed factory manager of the Briscoe Motor Car Corp., Jackson, Mich. He was formerly manager of the Newcastle, Ind., plant of the Maxwell Motor Co.

H. J. Volger of the Maxwell Motor Sales Corp. has been appointed eastern supervisor, with headquarters at Long Island City, N. Y. His territory includes New York, Connecticut, Rhode Island, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, West Virginia, District of Columbia and North Carolina.

Joseph A. Schlecht of the Mound City Auto and Buggy Co., who has been chairman of the show committee of the St. Louis Automobile Manufacturers' and Dealers' Association for the past two

years, has been elected president of the organization. In reporting on the association's recent show Mr. Schlecht said that there were 26,827 paid admissions at 50 cents, as compared with 31,805 at 25 cents each last year. Rebate checks for 95 per cent. of the total amount paid in by the dealers to finance the show were distributed.

The other officers of the association elected at the meeting were: Vice president, H. C. Farrenkrog, Kardell Motor Co.; treasurer, Herman L. Schnure of the Velie Automobile Co.; directors, F. W. A. Vesper of the Vesper-Buick Auto Co., H. W. Spaulding of the Packard Missouri Motor Co., W. L. Johnson of the Johnson Automobile Co., Frank R. Tate of the Tate-Gilham Motor Car Co., J. D. Perry Lewis of the Lewis Automobile Co., I. G. McNiece of the Cadillac Automobile Co.

The New Jersey Products Co., West Orange, N. J., has been incorporated to handle the products of the various Edison companies. The company is capitalized for \$500,000. The incorporators are: Thomas A. Edison, Charles Edison, R. H. Allen, Stephen B. Mambert and A. C. Emrey.

The Maxwell Motor Car Co., Detroit, Mich., is planning the erection of an entirely new plant on Oakland avenue, in that city, and will also build a new administration building.

E. G. Seward has been appointed assistant sales manager of the Smith Form-A-Truck Co. of Chicago. Mr. Seward, who recently resigned from the Nash Motors Co., has appointed the Leach-Frawley Motor Co., San Francisco, as distributors on the Pacific coast for Smith Form-A-Trucks.

J. Allen Smith, president of the U. S. Light and Heat Corp., Niagara Falls, N. Y., who was taken sick while returning from a western trip recently, is in Ashville, N. C., where he is rapidly recuperating.

The Maxwell Motor Car Co., Detroit, Mich., has offered \$5000 in cash prizes to be distributed among dealers, together with the award of the National Maxwell Economy Championship Cup. The contest will be held on May 23. The contesting dealers are required to arrange with owners for the use of two Maxwell five-passenger touring cars. These cars, which are to be borrowed for the day, will be fitted with two one-gallon gasoline tanks attached to the windshield. The cars will make the run together, each carrying four passengers, including the driver and three official observers. The observers will attach their signatures to the affidavits that are rendered of each test. The first prize will be \$200 in gold; second, \$150; third, fourth and fifth, \$100 each; sixth and seventh prizes, \$75 each; eighth, ninth and 10th, \$50 each.

The Barnett Auto Body Co., Portland, Ore., is building a new plant in that city. At present the company is conducting its manufacturing operations in the Pacific Storage Co.'s building.

The Chelsea Steel Ball Co. has been organized at Chelsea, Mich., with a capital of \$75,000 and will build a plant near the Chelsea Screw Co. of that city. Timothy F. Callahan will be manager of the enterprise.

The Kraus Auto Oil Motor Corp., 25 Church street, New York City, owner of the patents for the Kraus oil burning engine which has a combustion chamber from which gas under pressure is fed to the cylinders, is planning the manufacture of the engines. The company is also offering to license manufacturers under its patents.

The Dort Motor Car Co., Flint, Mich., has increased the price of its touring and roadster models \$30, making the new price \$725.

The H. J. Graham Engineering Corp. has been organized at Dover, Del., with a capital of \$35,000 to engage in the manufacture of automobile engines and similar products. H. J. Graham, F. W. Unger and C. Y. Abbott are the incorporators.

H. S. Daniels has joined the Dort Motor Car Co. He was formerly advertising manager of the Kissel Motor Car Co. He

has been succeeded by Ralph Kay of the advertisement department of the Stewart Warner Speedometer Corp.

Dick Farrington, formerly advertising manager of the Gibson Auto Co., Indianapolis, Ind., has been made advertising manager of the Parker Rust Proof Co. of America.

Col. K. C. Pardee, well known in retail automobile circles in New York City, died at his home in Chicago on April 12. He was in his 72nd year.

W. E. Stalnaker, vice president and director of sales of the Pathfinder Co., has tendered his services to Harry B. Smith, adjutant general, in recruiting an aero squadron of 168 officers and men. As a result of a recent canvass among Pathfinder dealers, Mr. Stalnaker says: After thoroughly diagnosing the situation, we have arrived at the conclusion that there is to be a great shortage of automobiles—we might add a great shortage of motor driven vehicles.

The Timken-Detroit Axle Co., and Timken Roller Bearing Co. will on May 1 move their Chicago office, now located at 1335 People's Gas building, to suite No. 1843 People's Gas building.

J. H. Faw, Inc., New York City, has acquired the patents and business of the Lennon Mfg. Co., which manufactures the Lennon light protector.

The Kissel Motor Car Co., Hartford,



W. E. Stalnaker, Vice President and Director of Sales, the Pathfinder Co., Indianapolis, Ind.

Wis., has appointed the following agencies as distributors of Kissel Kars: Anderson Auto Co., Muskogee, Okla.; Amsler & Co., McGregor, Tex.; Sampson & Freberg, Bricelyn, Minn.; L. E. Sprowl, Melette, S. D.; H. E. Miller, Longmont, Col.; B. H. Jacobs, Healdsburg, Cal.; A. M. Smith, 2232 Chester avenue, Bakersfield, Cal.; G. E. Willis, South Manchester, Conn.; F. H. Inglehart, Belair, Md.; Mar-Pen-Vir Mobile Co., Hagerstown, Md.; Crescent Auto Co., Tarentum, Penn.

The Stayboston Mfg. Co., Germantown, Penn., announces that Herbert H. Jinnett, formerly with the Bell Telephone Co. of Philadelphia, has been appointed credit manager.

The General Motors Co. of New Jersey will hold a special meeting on May 10 at the office of the company in Jersey City, when the stockholders will pass upon the proposed retirement of its preferred stock at par and accrued dividends to Aug. 1, 1917. Of the \$20,000,000 preferred stock authorized there is outstanding \$14,985,200 par value.

The Bell Motor Car Co., York, Penn., announces the appointment of D. M. Manning as director of exports with headquarters at the company's offices in New York.

Automotive Engineers to Meet

Engrossed in Wartime Activities They Cut Program to One Day in Washington

The summer meeting of the Society of Automotive Engineers, scheduled to be held the last week in June at Ottawa Beach, Lake Michigan, has been called off by the council of the society on account of war conditions. The engineers are engrossed in war activities and few of the members have the spare time for such a meeting. Instead it was voted to spend one day on the summer meeting and hold it in Washington, D. C., on Monday, June 25, the capital being selected because many government departments are closely associated with the work of the society.

The activities of the society, however, have not been reduced, as such announcements might tend to indicate. Instead of the large meeting there will be several smaller and more specific ones.

The tractor engineers, amalgamated with the S. A. E., are confronted with one of the largest problems of the day—the conservation of our agricultural resources and more intensified agriculture. The society faces lack of standardization in the tractor field as compared with the motor car and motor truck field, and its first work in the form of a special meeting will be to get the tractor makers and the government agricultural interests working together more closely. It is expected that in the near future a meeting to this end will be held. Such meetings will probably take place during the coming summer.

The summer meeting of the standards committee will be held in Cleveland on May 3. Besides the 140 men on the various divisions of the standards committee under the direction of Chairman John G. Utz, a call will be made to the members at large of the society to attend, as the standardization work is of greatest importance in face of demand production.

A special meeting may be required by the new branch of marine engineering recently amalgamated with the society and representing motor boat work, such as submarine chasers.

A Washington office of the society will be opened in the Munsey building in connection with the Council of National Defense. General Manager Coker F. Clarkson, or his assistant, Herbert Chase, will probably represent the society in the Washington office.

JONES WILL INVESTIGATE MARKETS IN THE FAR EAST.

Tom O. Jones, well known in Indianapolis, Ind., has been chosen by the Bureau of Foreign and Domestic Commerce of the Department of Commerce to investigate the automobile markets in the Far East. He will visit the principal automobile centres before sailing to

familiarize himself with the export problems of the individual manufacturers.

Manufacturers who wish to consult with Mr. Jones before he sails should address him at room 409 Custom House, New York City.

LIBEL DECISION AGAINST FORD.

Justice Mayer of the Federal District Court of New York, in the libel suit for \$1,000,000 damages brought against Henry Ford by the Vitagraph Co. of America, granted a judgment on pleadings in favor of the plaintiffs. Justice Mayer, however, allowed the defendant leave to answer the complaint within 20 days.



NEW YORK BRANCH WINS BEARINGS SERVICE CONTEST.

The Bearings Service Co. recently held a display contest in which the various branches throughout the country competed. The New York City branch won first honors with a display showing an automobile chassis with the various bearing locations indicated by ribbons attached to the points and leading out to placards which gave the name of the part in which the bearing was used and type of bearing.

A. K. Hebner, general manager of the Bearings Service Co. of Detroit, in speaking of the contests, says that the remarkable interest shown in the window displays of Timken-Hyatt and New Departure bearings has convinced him that the automobile owner is ever glad to receive instruction on the mechanism of his car and to learn how the various vital parts, though hidden from sight, should be cared for.

FATALITY MARKS FIRST AUTOMOBILE TRACK EVENT.

The first automobile contest of the season, the 100-mile George Washington

Classic, held at Stockton, Cal., was marred by the death of a boy caused by an accident to the machine driven by O. Valdsmar.

Billie Boldon won the event, making the distance in one hour and 40 minutes, which time establishes a new record for the Agricultural Park track. He also made the fastest mile during the contest, covering it in 55 seconds. Mike Moosie took second money, and Sterling Price came in third. The race was held under the auspices of the Northern California Automobile Race Association and was sanctioned by the A. A. A.

FIFTY METZ CARS FOR BRAZILIAN IMPORTER.

Charles H. Hansen, one of the largest Brazilian importers, has placed an order with the Metz company of Waltham, Mass., makers of the Metz car with the gearless transmission for 50 cars. Mr. Hansen has signed up with the Metz company to act as distributor for Metz cars for the entire Brazilian territory.

Following the advice of the foreign trades committee, Manager Roscoe A. Pickens of the Metz company has been seeking South American connections in an endeavor to get the automobile trade that hitherto American manufacturers were unable to secure. Shortly after the start of the European war, when the countries in the great strife were no longer able to obtain the material nor the tonnage and stop car shipments to South America, many small automobile plants rose there and at the present time they are making many of their own cars. Metz cars have attracted such favorable comment, however, that there is considerable demand for them.

Mr. Hansen looked over the field very thoroughly before selecting the car which he wished to represent. He made a thorough canvass of the Brazilian market and found that the Metz has a reputation that sells the car on sight, especially in the rougher mountain regions where the Metz friction drive has made it possible for the car to climb any hill and even traverse roadless countries. The car is recognized there as a machine that primarily gives service, and Mr. Hansen says that this is just the kind of a car he needs to meet local competition. He feels that he has something on every South American manufacturer for economy of operation, flexibility, simplicity and power.

ADVERTISING SIGNS IN ILLINOIS MUST GO.

An order has been sent out to all sign companies and advertising companies by the Highway Engineer of Illinois, to remove all signs from the public highway right of way. A ban has been placed on advertising signs on bridges and culverts by the Iowa State Highway Commission, also, but the order has not as yet been issued in that state to have them removed from the right of way.

W. W. Marr, state highway engineer, says that the sign boards are nuisances.

Car From Many, Travels Far



H. G. Gremel, Manager of Puritan Machine Co., Detroit, Mich., in Car Made of Orphan Parts, Which Has Been Driven Over 15,000 Miles.

H. G. Gremel, general manager of the Puritan Machine Co., Detroit, Mich., is the possessor of an automobile which defies a single identity and is undoubtedly the most unique in existence.

As is well known, the Puritan company foster the orphaned parts of nearly 100 different makes of cars whose manufacturers have gone out of existence. With all these parts Mr. Gremel decided to construct a car for himself which would be made up of parts taken from as many different makes of car as possible, with the result that he managed to incorporate parts from some 102 different orphan cars. The steering gear was originally intended for one make of car, the gearset for another, an axle that should have done duty in a third, wheels that were meant for another kind. All the other parts were also selected from machines that were not represented in the construction in any other part. On the finished chassis he placed a Krit body. This heterogeneous assembly would seem to be anything but practical, but the car is very serviceable and has been driven by the owner over 15,000 miles. It is a strong illustration of the value of the standardization that has been going on among car and parts manufacturers during the past few years.

HYATT CO. ANNOUNCES TRACTOR LETTER CONTEST.

The Hyatt Roller Bearing Co. has instituted a new publicity idea to stimulate interest in its roller bearings for tractors. The tractor department of the company at Chicago, Ill., has gotten out a set of booklets and circulars under separate cover which will be mailed at intervals of a week or 10 days, one piece at a time, to every tractor salesman and dealer in the United States.

One of the circulars contains the announcement of a prize offering for the best letter on the selling advantages of Hyatt equipped tractors. These letters

should be mailed to "Hyatt Helps," 1120 Michigan avenue, Chicago, Ill. A prize of \$100 will be given for the best letter, \$50 for the second best and \$25 for the third.

STUDEBAKER MEETINGS AND ELECTIONS HELD IN NEW YORK.

At the annual meeting of the stockholders of the Studebaker Corp., J. M. Studebaker was elected to the vacancy created recently by the death of his father, who was one of the founders of the great industry. L. J. Ollier, M. F.

Wollering and A. B. Thielens, whose terms on the directorate expired, were re-elected.

At the subsequent meeting of the directors the following board of officers was elected: Chairman of the board, Frederick S. Fish; president, A. R. Erskine; treasurer, C. C. Hanch; secretary, A. G. Rumpf; vice president, L. J. Ollier; four assistant treasurers, C. D. Fleming, George A. Fulmer, J. M. Peterson and W. P. Shillington; counsel, Frederick P. Delafield; general auditor, H. E. Dalton.

The old directors of the Studebaker Corp. of America were re-elected at the meeting of that corporation and the old board of officers, which is the same as that of the Studebaker Corporation.

H. W. FORD ON NATIONAL ADVERTISING ADVISORY BOARD.

Harry W. Ford has been appointed a member of the newly organized National Advertising Board, which will take charge of government advertising during the war.

KANSAS CITY DEALERS HAVE PROSPERITY DINNER.

The members of the Kansas City Motor Car Dealers' Association held a "prosperity dinner" last week at which the speakers were very optimistic as to the future of business in that territory. The opinion was unanimous that there was nothing in the outlook, not even the war clouds, to warrant the expectation of any change in the prosperous times for a long time to come.

Unique Haulage Feat by Trucks

A feat in heavy haulage was performed at Camp Stewart, on the Mexican border, with the use of motor trucks that will stand for a long time as a record performance of its kind. When F-W-D Truck Co. No. 20 was ordered to move to the Motor Truck Park, El Paso, the officers decided to move the company's house, a building 20 feet wide and 46 feet long. To avoid the time and trouble of knocking down the house and re-erecting it again at the park, it was decided to move it on four trucks. A F-W-D truck

was backed under each corner of the building, those at the rear being driven backwards on the reverse gear. As it was impossible to travel on the roads owing to the width of the building, the trip was made across sand lots and through the open country uphill and down; through gullies and ditches and over country that was anything but suitable for heavy truck traffic. The trucks had to be maintained at even speed and the trip of seven odd miles was covered inside of an hour and three-quarters.



Four F-W-D Trucks Carry Building Seven Miles Across Desert.



ZENITH CARBURETOR

KNOWN the world over as the *zenith* of carburetor efficiency. A long list of American builders of cars, trucks and aeroplanes believe this simple, plain tube device to be the best insurance for permanent carburetor satisfaction.

Zenith Carburetor Co.
New York Detroit, U.S.A. Chicago

QUERIES

NOTICE TO READERS.

THIS department contains the Mechanical Editor's answers to readers' inquiries. It is open to every subscriber. If any part of your car is not operating satisfactorily, or if you desire information regarding operating, maintaining or repairing motor cars, do not hesitate to lay your troubles before him. He will answer promptly and fully, either by mail or in these columns, as you direct. This service is free to every subscriber, and is often the means of saving considerable money that otherwise would be spent with a garage man. Letters should always be signed with the writer's full name and address, and the car or part in question should be properly identified, by mentioning the maker's name, model, year of production or other distinguishing feature. Address all inquiries to the Mechanical Editor.

ACTION OF ELECTROLYTE IN BATTERY.

(H. R., Homewood, Kan.)

Will you please tell me the action of the electrolyte in a storage battery? The specific gravity of the electrolyte before and after charging, etc.?

1.842 is the specific gravity of sulphuric acid when chemically pure and this grade should always be used as only a very small percentage of impurities in it will materially damage the cell. In mixing the electrolyte always use the sulphuric acid manufactured from sulphur, mixing it with distilled water in a glass or porcelain dish, carefully adding the acid to the water, stirring it constantly while it is being mixed. With the addition of the acid there will be a rise in temperature. After the addition of the acid, let the electrolyte stand until the temperature is reduced to normal. Never put it into the battery while it is hot.

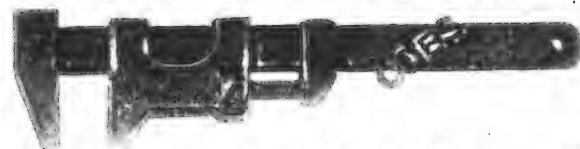
The electrolyte ordinarily used when a battery is shipped from a factory has a specific gravity close to, or about, 1.300, when fully charged, and the instruction of the maker is to maintain it at 1.285 when fully charged and not to discharge it below 1.8 volts a cell, which is equivalent to a gravity of about 1.170. At a specific gravity of 1.285 the percentage of acid to water by weight is 37.5, and at 1.170 it is 23.7 or thereabouts. In charging the density increases and in discharging it decreases. These figures given are taken at a temperature of 60 degrees Fahrenheit. With every rise of 10 degrees there is a corresponding drop of three points in the specific gravity; with every drop of 10 degrees there is a rise of three points in the specific gravity.

There is no change in volume of the electrolyte in charging or discharging, practically the only change being that of a rise of the specific gravity, which continues until the battery is fully charged.

When fully charged the specific gravity of the electrolyte should be between 1.285 and 1.300. This latter figure is the maximum specific gravity permissible. When the battery is fully charged, as evidenced by the continuance of voltage at the same point for half an hour, and by the ceasing of gassing, the specific gravity of all cells should be brought to the same point by the addition of 1.285 electrolyte or water as the case may be. The charging current should then be continued for a time to thoroughly mix the new electrolyte.

During the charging the temperature of the electrolyte should not exceed 100 degrees; if it should exceed 100 degrees the charging current should immediately be cut off or lessened. As there is a certain amount of oxygen and hydrogen liberated, never permit open fire near the battery while it is being charged.

There are a number of little points to be noted about the




Ask For The Best Wrench

Your dealer will show you just the size you need for your tool kit, or for repair work.

He will recommend the COES wrenches as all good dealers have done for fifty years.

Coes Wrenches do not break, or wear out, in service life they cost less than any other tool made.

COES WRENCH CO.
WORCESTER, MASS.



A NEW PACKAGE

You can now obtain from your dealer a new package of

DIXON'S Non-Leak Grease No. 680

put up in 2½ lb. cans for Ford differentials. Dixon's Non-Leak Grease No. 680 "stays put".

Send for booklet 210 G.

Made in Jersey City, N. J. by the
JOSEPH DIXON CRUCIBLE COMPANY
ESTABLISHED 1827

DIXON'S
Automobile
LUBRICANTS



WONDER-JAST

THE ORIGINAL SPRAYER POLISH

You can get it anywhere.

PAIGE

It is a well known fact that Paige Dealers are among the biggest money makers in the Motor Car Field

The Most Beautiful Car in America

An inspection of the Paige line will explain why. Write for complete particulars.

PAIGE-DETROIT MOTOR CAR COMPANY, Detroit, Michigan

CARS OF DISTINCTION. ENDURANCE. ECONOMY, COMFORT

5

Passenger
Tearing Car

\$985

Elgin Six

4

Passenger
Roadster

\$985

ELGIN MOTOR CAR CORPORATION, 2427 So. Michigan Ave CHICAGO, U. S. A.

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ELCAR

ELCAR

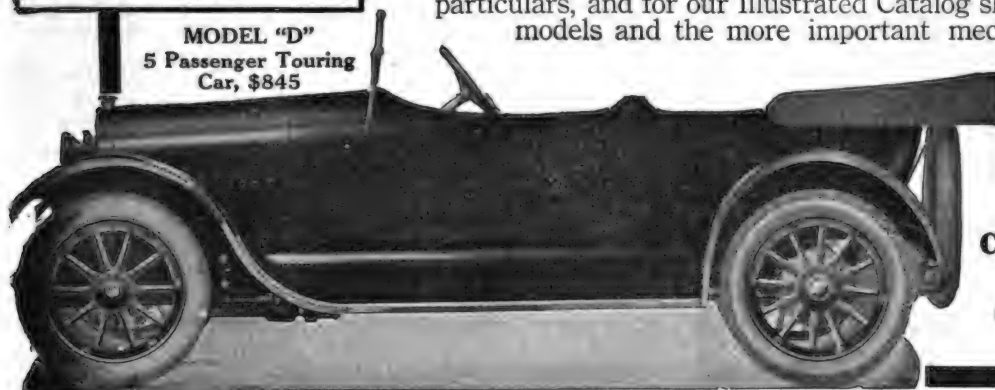
The Elcar at \$845

Does Its Own Talking

A Few Elcar Specifications

Wheel Base—As long as some cars selling up to \$3,000 and more—115 in.
Motor—4-cylinder; long stroke; high speed; 34.7 h. p. at 1,800 r. p. m.
Fuel Supply—Stewart vacuum system.
Ignition—Delco automatic spark advance with manual control.
Starting and Lighting—Dyneto two-unit; double-bulb headlights; Willard storage battery.
Clutch—Dry multiple disk—seven plates, steel on Raybestos.
Rear Axle—Full-floating with roller bearings at each end of wheel hubs.
Differential—Spiral bevel driving gears, with roller main bearings and ball thrust bearings.
Brakes—Internal and external, two inches wide on 12-inch drums.

MODEL "D"
5 Passenger Touring Car, \$845



Looks better than its price, and is just as good as it looks. A car of distinctive beauty, well designed, well built, well finished—a car in which quality speaks right out.

Three Models at One Price

**Five Passenger Touring Car Four Passenger Touring-Roadster
 Two Passenger Roadster**

Secure it for your territory We want to place our proposition before live dealers in territory not already assigned. Write us for particulars, and for our Illustrated Catalog showing all ELCAR models and the more important mechanical parts, and describing the construction of the ELCAR even down to its small details.

Elkhart Carriage & Motor Car Company

6811 Beardsley Avenue
 Elkhart, Indiana

battery after it has been overhauled regarding the testing of the electrolyte, its density, during and after charging. In making tests for specific gravity as above directed, make the test while the charging current is running through the battery, for as soon as the current is cut off the specific gravity will drop.

If new wood separators or elements have been put into the cell a certain amount of the electrolyte will be absorbed by them and more must be added to make up for it. If old separators or elements have been used, or if they have been washed with water, the new electrolyte will be somewhat diluted, necessitating the addition of stronger electrolyte to make up to normal.

After the battery has been overhauled the first or forming charge should be a lighter current than is used for subsequent charges. The current used in the forming charge should be about one-half the finishing rate as marked upon the battery, kept up for about 48 hours. If this is not possible, the finishing rate may be used for 24 hours. The temperature should always be carefully kept down to normal.

WATER VAPOR IN CARBURETOR INTAKE.

(R. B. P., Kansas City, Mo.)

I have fastened a tube to the overflow pipe of the radiator on my car, with the idea that perhaps the water vapor from the radiator could be employed to advantage by introducing it into the carburetor intake. This tube I have connected with the intake manifold. Will the water vapor or steam be injurious to the engine? Will it add anything to the power?

The question of introducing steam into an engine to increase its efficiency and reduce the carbonization of oils, etc., on the cylinders has been greatly discussed. It has been proven that when steam is forced or carried into the cylinders, carbon is removed with no damage to any of the parts involved.

There are a number of devices upon the market designed for the purpose and applied in practically the same way as

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you have fitted your car. These devices are the result of experiment on the part of the several manufacturers and that they have faith in their device is sure or they would not put it upon the market.

That the introduction of steam into an engine does increase its efficiency has been proven; by experience you probably know that an engine runs better on a foggy day. The question as to whether or not your device is efficient can only be settled by experiment. With your car traveling about 15 miles per hour, note whether air is forced through the pipe which you have screwed to the manifold, also note whether or not the air seems moist.

With your car moving at about 15 miles per hour, the air pressure is about .0001 pound per square inch. It is an open question as to whether such an extremely low pressure would force any air or water vapor into either the carburetor or manifold. If it did not then it would be worthless.

Another point to be considered is the fact that even with circulation of air would there be any water vapor present in the radiator. Does your radiator "run warm?" If it does not generate water vapor, then again the device fails.

As we have said before, we do not presume to criticize the actual efficiency of such a device. It is only a question of application to certain cooling systems. At any rate it should not be injurious to the engine.

ENGINE GIVES NO POWER.

(A. J., Providence, R. I.)

I have recently had my engine all to pieces and replaced all the worn parts, valve guides, readjusted bearings, etc. The compression is good. I have installed all new rings and replaced all spark plugs. The ignition system has been entirely overhauled, rewired and a spark is furnished to every plug. The engine runs at slow speeds all right, but when speeded does not develop power. Will you please tell me where to look for the trouble? The valves and tappets have about 1/8 inch clearance. Is this enough?

THE PLUG with the GREEN JACKET NO BROKEN PORCELAIN

To Cause Trouble and Expense



The Ruby India Mica Core gives to THE PLUG with the GREEN JACKET an efficiency and long life that cannot be hoped for in porcelain-cored plugs. Save the trouble and annoyance which cracked and broken porcelains have given you by equipping your engine with the plug that cannot break; that will not break—SPLITDORF.

A SIZE AND TYPE
FOR EVERY ENGINE

PRICE **\$1.00**
EACH

Wherever Motor Accessories are Sold.

SPLITDORF ELECTRICAL COMPANY
of Boston

1112 Boylston Street,

BOSTON, MASS.

NEW DEPARTURE BALL BEARINGS




American Made
FOR
American Trade
QUALITY
FIRST

THE NEW DEPARTURE
MANUFACTURING CO.
CONRAD PATENT LICENSEES
BRISTOL, CONN., U.S.A.

TRADE MARK

NEEDHAM

REG U. S. PATENT OFFICE

Highest Quality in Design—Workmanship—Material

Not Theory But Proven Facts

You Have Tried the Rest
Now Get the Best

NEEDHAM TIRE COMPANY

Charles River,

Massachusetts

(When Writing to Advertisers, Please Mention The Automobile Journal.)

As you have evidently covered all ignition troubles and are sure that a spark is furnished to each cylinder, the trouble is probably in the fuel supply, at some point between the tank and the cylinder explosion chambers.

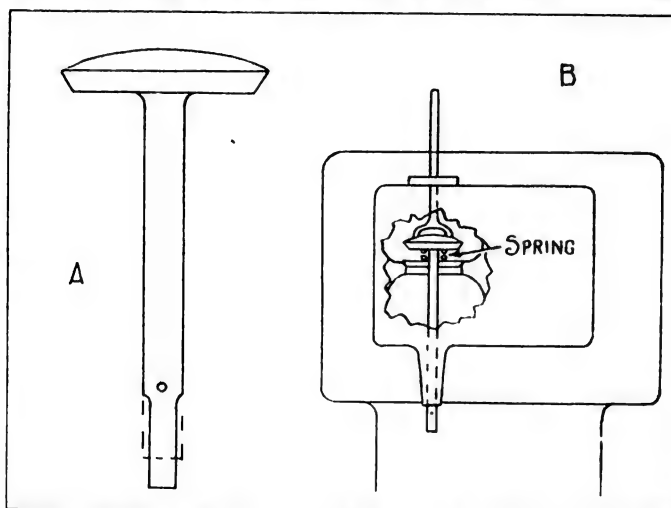
In the first place, the clearance between the valve stems and tappets is too great. This distance should not be over 1/32 inch or under 1/64 inch. The engine is designed to have a certain valve opening, and unless this opening conforms with the design a loss of power results.

There are a number of devices upon the market for making the Ford car valves adjustable for wear. If not able to obtain them it is practical to adopt the following procedure:

Remove the valve from the engine and heat the stem red hot to soften it; place it in a U block and hammer around the stem, near the end, turning it at intervals so as to distribute the blows evenly and prevent warping or bending. If this is not done then the stem will be extended unequally and the face will not rest properly upon the tappet when it is in place. After a number of blows it will be found that the valve stem has been lengthened slightly. It should then be put back into place and the stem refaced by filing. Care should be observed not to pound the valve or stem at any point where it fits into the bearing surfaces.

If the car has been run over 5000 miles it is possible that the valves have become pitted or carbonized, so that it will be a good plan to regrind them.

The valve should be placed in the seat with the edges coated with a good grinding compound, or fine emery. With a small, round handled tool about six or seven inches long,



A—A Lengthened Valve Stem. B—Method Used in Grinding Valves.

it should be given about a quarter turn backward and forward, the handle of the tool being rolled between the fingers, and at frequent intervals the valve should be lifted clear of the seat. (This operation will be made easy by the placing of a small spring beneath the valve head as shown in the illustration). This will soon cut away the metal of the seat and the valve. The position of the valve on the seat should be changed after each half dozen rolls of the tool. If the valve is revolved the seat may be cut in circles, which will necessitate additional grinding to remove, and possibly retiming the valves.

The grinding compound should be used in very small quantities and applied often. No pressure should be applied to the tool other than to keep its fork in the holes of the valve head and to compress the spring. The grinding should never be continued after a good surface has been obtained. The best results are obtained by the use of a fine finishing compound after the first operation, resulting in a smooth glass surface, which resists the action of heat and gasses better than a rough surface.

While grinding the valves it is best to place a piece of waste with a string attached in the valve pocket, to prevent any abrasive being worked into the pocket and thence into the cylinder; also, the valve and seat should be carefully cleaned with gasoline when the grinding is completed.

Common causes for lack of power are improperly fitted manifolds, gaskets or leaks in the carburetor system, condi-

tions often caused by the use of old manifold gaskets. When a copper-asbestos gasket has been used the irregularities in the castings are compensated for by the soft gasket. After the gasket has been used once it is almost impossible to get all parts back in the same position and it is therefore advisable to always use new gaskets when replacing parts.

The gasket should be covered with oil when putting it into place. The faces should be carefully cleaned. This applies to the contacting casting surfaces, as well as the gasket surfaces, for, if a piece of carbon or a bit of dirt gets between the gasket and the casting a leak is formed and loss of power results.

Another cause for lack of power is leakage at the spark plugs. Before putting the plugs into place coat the threads with oil, or a paste of graphite and oil, to insure tight joints and to facilitate the removal when necessary. After the engine has been running a short time and is heated, go over the plugs and tighten them. Leakage at the plugs may be located by squirting oil upon the joints while the engine is running. If bubbles form it is an indication of a leak.

Water or dirt often accumulates in the carburetor float chamber or passages, hence the carburetor should be taken apart and thoroughly cleaned at least once a year. Make it a point to drain the carburetor chamber through the petcock at the bottom at least once a month. On the under side of the gasoline tank, where the pipe leads to the carburetor, will be noticed a dirt and water catching trap. Drain this trap by letting out about a glass full of gasoline once a month.

SPEEDOMETER CORRECTION.

(F. S. C., Riverton, N. J.)

My car as originally built was equipped with 30-inch wheels and shoes, also speedometer. I have substituted this combination with 31-inch shoes. What adjustment in the mileage registration should I make to correct the error caused by the change?

You do not state whether you have changed the size of the wheels or the shoes only. We assume that the latter is the case, and that you have equipped the car with "oversize" tires. If this is the case you will find that the actual mileage traveled will not differ to any noticeable extent from the mileage indicated on the speedometer.

If you have put on 31-inch wheels, as well as tires, you may find that there is a slight error in the actual registration.

Theoretically your speedometer will register but 30/31 of the actual mileage traveled; 30/31 of the speed also. This means that for every 31 miles you travel your speedometer will total but 30 miles. If the car travels at the rate of 31 miles per hour the speedometer will indicate but 30 miles per hour. This is theoretical; however, you will find in practise that the error is immaterial.

The speedometer is designed to register wheel transverse on the basis of a 30-inch diameter. With 31-inch tires or wheels and weight in the car the diameter will be slightly reduced so that the actual registration will be equivalent to that for which the speedometer is designed.

It would be almost impossible to design a speedometer which would indicate the absolute mileage traveled, as the difference in diameter of the tires caused by pressure or weight in the car would vary with different loads.

TROUBLE WITH TRANSMISSION GEARSET.

(M. S., North Tarrytown, N. Y.)

The transmission gearset of my Ford T car is causing me some trouble. When the clutch is put into high speed it sounds as though it was rubbing against something. Can you tell me what the trouble is?

Your trouble is probably due to the fact that the master disc, or distance plate, has either worn a groove into the brake drum or dropped down between the disc drum and brake drum.

In order to fully understand this you must know just how the transmission gearset at this particular point is made. When the gearset is removed from the case it will be found

(When Writing to Advertisers, Please Mention The Automobile Journal.)



THOSE who desire from their engines the utmost efficiency, and the utmost reliability, who desire to be without the annoyance of constant battery attention, specify

BOSCH
MAGNETO IGNITION

Bosch Magneto Co., 204 West 46th St., New York

Service Stations in every state.



SPECIAL SHIELD FOR FORD COMMERCIAL CARS

Demand for a sturdy, practical, up-to-date windshield for use on Ford commercial cars has prompted us to perfect a special shield to supply body manufacturers and jobbers.

Does away with stay-rods.—Our special shield bolts securely to a straight dash. Eliminates use of awkward stay-rods and clips, as brackets hold shield rigidly in place. Embodies approved rain-vision, ventilating features. Best materials and workmanship throughout.

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Write direct to us for full information and prices. As successors to the Vanguard Mfg. Co., the Rands Mfg. Co., the Diamond Mfg. Co., the Superior Mfg. Co., and the Universal Metal Co., we are equipped to give you prompt delivery and first-class service.

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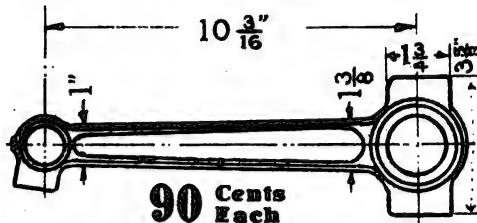
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THE ONLY PERFECT SPOTLIGHT
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Heavy, Medium and Light
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to consist of three drums, fastened together, but so arranged as to rotate independently. Fastened upon the front part are three gears, one for each drum, which mesh into three triple gears mounted upon studs in the engine flywheel. The last drum, or the one at the back of the gearset, is the brake drum, to which is fastened the driving plate, the high speed clutch spring and assembly of clutch fingers. When this driving plate assembly is removed from the brake drum it will be found that within the recess of the brake drum are contained 26 thin tempered steel plates or discs. The inner circumference of the brake drum is machined so that it has six tongues, or splines, that project inward toward the centre. These have square edges and are equidistant about the circumference. On the end of the transmission shaft is secured the clutch disc drum, so-called, which is a spider with a sleeve that fits on the shaft, with the circumference of the drum extending nearly even with the rear edge of the brake drum. This clutch disc drum is secured by a key that will prevent it revolving on the shaft, and there is also a set screw that is "spotted" so that the drum may be located with reference to precise position, the screw contacting with what is known as a "spot" on the shaft.

This drum has on its outer circumference six ribs, or splines. The clutch discs are placed in the space between the brake drum and the clutch disc drum, the inner or bottom disc being a plate known as a distance plate, or master disc, that is about three times the thickness of the other discs.

This distance plate has notches in its inner circumference which fit the ribs or splines of the disc drum, and next to this is placed a thin plate that is notched to fit the clutch disc drum. Then the plates are assembled, alternately fitting their notches to the splines of the brake drum and the clutch disc drum, until the entire number (26) have been placed in the recess.

After continuous use it often happens that this distance plate cuts or wears into the brake drum to such an extent that it does not function properly, sometimes dropping down between the brake drum and the clutch disc drum. When this happens a grinding noise results.

WANTS TO KNOW ABOUT GEAR PUMP.

(A. M., Louisville, Ky.)

Will you please explain to me just how a gear pump is made and how it works? By this I mean, just how the oil circulates and in what direction.

The ordinary gear pump is perhaps as simple a circulating device as there is made. Upon reference to the accompanying diagram the working of this type of a pump is made clear.

Two gears are mounted in a tight housing which is fitted with an inlet A and an outlet B. The housing is made so that a tight fit is secured on the tops, bottoms and sides of the gears, which are ground flat, a portion of the circumfer-

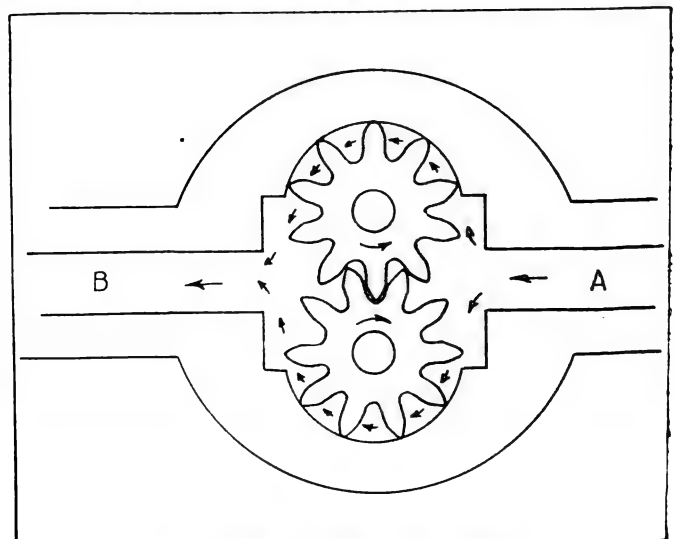


Diagram of Simple Gear Pump.

ence fitting against the teeth of the gears so that when the gears are stationary no liquid can get from A to B. As the gears revolve, driven by a shaft through one of them, the gap between each tooth of each gear carries a certain amount of liquid around with it from the inlet chamber to the outlet chamber. As the teeth mesh together at the centre of the pump all the liquid is squeezed from between them and prevented from running back to the inlet chamber. Such a pump is very positive in action and as long as the joints are kept tight a very high pressure may be obtained. The action of this type of pump differs from that of the plunger type in that a reversal of the direction of rotation results in a reversal of the flow of the liquid. The arrows in the illustration clearly show the direction of gear rotation, as well as the flow of the liquid.

**TRY THE INQUIRY BUREAU SERVICE
OF THE AUTOMOBILE JOURNAL.
(This Is for YOU.)**

If your car is causing trouble and you do not know how to fix it, you are not taking advantage of our inquiry bureau service unless you write us. Remember it is part of the magazine and your privilege to ask us any question in regard to an automobile that you wish, and we will be glad to answer it.

Always give us as much information as you can, the name, date and model of the car. Remember that we do not see the car and may not know how it is equipped unless you tell us. Give us a chance to help you. We answer such letters by mail, as well as in these columns.

(Continued from Page 26.)

ficiently point out the place where the alleged offense was committed; and for the further reason that it did not show wherein the operation of the car was careless. The trial court overruled the demurrer, but the Supreme Court reversed the ruling and ordered the case remanded.

The court further said that it is ordinarily sufficient to allege the place where an offense is said to have been committed with particularity enough to show jurisdiction over it. But where an act is criminal only when done at a particular place the place becomes a matter of essential description, and must be alleged with reasonable certainty. The case in hand is of this class; operating an automobile carelessly is a crime only when it is done on a way laid out by statutory authority; and, therefore, the particular place is material and should have been alleged.

It is true that the crime here charged is statutory and that the complaint follows the language of the statute. But such a complaint is sufficient only when it charges, expressly or by necessary implication, every fact necessary to constitute the offense.

CAR "OPERATED" WHEN STANDING STILL.

IN A RECENT Connecticut case it appeared from plaintiff's testimony that he was the owner of a damaged car; that he had falsely registered it; that at all time thereafter it remained so falsely registered; that he had driven the car about the state for pleasure; that on the day of the accident, on arriving in Hartford, he left the car in a part of the highway opposite the hotel, which is commonly used for parking automobiles, with all power shut off, brakes set, and no one in charge; that later a large motor truck owned by the defendant was negligently driven into it, whereby it was damaged; and that afterward the plaintiff drove the car back to Middletown. At the close of the plaintiff's case the court granted a nonsuit on the authority of section 19 of the motor vehicle act of 1911, the material portion of which is as follows:

Section 19 provides that no recovery shall be had in the courts of this state, by the owner or operator, or any passenger of a motor vehicle, which has not been legally registered in accordance with sections two and three of this act, for any injury to person or property received by reason of the operation of said motor vehicle in or upon the public highways of this state.

The court held that the plaintiff's car was as much in the ordinary course of operation on the highway at the time of

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Don't Ride With Grinding Gears

Cold freezes grease. Gears then channel through it and work *without* lubrication. Excessive heat *melts* grease. Then it leaks out. In both cases you're riding with grinding, gritting gears.



Keeps gears—ALWAYS—apart

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Buy K-oo Special grade for gears—K-ooo grade for bearings. In orange colored cans only—at your dealers.

Write for free samples and book
"Lubrication of the Motor Car."

New York & New Jersey Lubricant Co.
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SIX BODY STYLES

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Write today for complete catalogue and territory information.

Full line of export models for foreign markets. Prices on application.

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"THE TENTH ANNIVERSARY CAR."

REGAL-4-THIRTY-TWO

Four Cylinder Motor
Full 22 H. P.
100 Inch Wheelbase

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REGAL MOTOR CAR CO., "Dept. B." Detroit, Mich.

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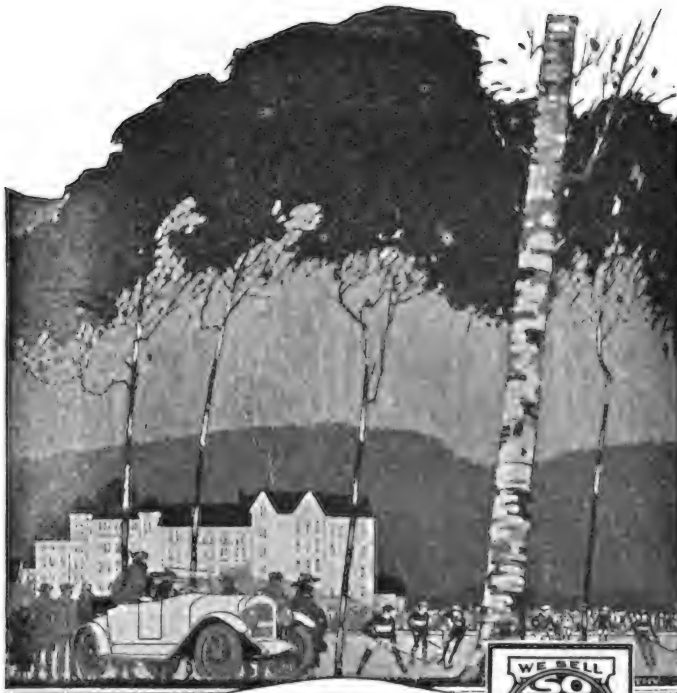
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PRESERVES ROADS

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No Day Too Cold for POLARINE

The Standard Oil for All Motors

Polarine feeds freely down to zero, giving to your motor the easy rhythm of mid-summer.

You will get more distance to the gallon with less wear on your motor by using Polarine Oil and SOCONY Gasoline. Look for the Red, White and Blue SOCONY Sign.

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the injury as if it had been used for shopping, calling or delivering merchandise. When so using the highways necessarily incurs the risk of injury from the negligence of fellow travelers, as well as while his vehicle is at rest as while it is in motion, and the injury complained of in this case was received "by reason of" the operation of the plaintiff's illegally registered car on the highway, the case comes within the plain intent of the act.

COVENANT TO REPAIR AUTOMOBILES.

THE plaintiff sued for repairs made in replacing burned bearings with new ones in an automobile sold by the defendant company. The contract of sale provided that "Vender covenants and guarantees to repair and replace at its garage in the city of Boston, or at its factory in the city of Providence, R. I., free of charge, any parts of said chassis (tires excepted) which may break under the normal service of purchaser, within one year after the delivery thereof, because of defective material or workmanship, or at vendor's option to deliver to purchaser, at vendor's garage, in the city of Boston, free of charge, new parts to replace any parts that may so break." The jury found for the plaintiff.

There was evidence that the crank case was cracked at the time of sale, by reason of which the oil leaked, causing the bearings in the motor to burn. This happened about two weeks after the sale. There was no evidence that the bearings themselves were defective, or "that — the work" was done "upon defective parts."

The defendant requested certain rulings, but the judge instructed the jury, in effect, that if the crack existed in the crank case at the time of sale, the defendant had the right to call upon the plaintiff to replace it with a perfect one, not to pay the damages from the leakage; and that the bearings themselves not being imperfect at the time of sale the plaintiff was not obliged to restore them, because of a defect in the crank case, causing them to wear out. The Supreme Court of Massachusetts further held that the judge erred in refusing to instruct the jury that if it found that the repairs were made necessary because of defective parts, then the jury should find for the defendant.

The plaintiff in the contract of sale guaranteed to repair and replace the parts of the chassis which became impaired within one year, under normal service, because of defective material or workmanship or, at its option to deliver to the defendant at its garage in Boston, parts to replace any parts so broken. Construing this stipulation with reference to the subject matter of the contract, the obligation of the plaintiff, to restore or deliver defective parts, was not confined merely to parts which were themselves defective. It extended to all the machinery which broke down, because of defects existing in the material or workmanship. While the plaintiff had the option of delivering parts to take the place of broken ones, and was not bound to make the repairs and restore them to the automobile, its obligation, was either to restore or deliver all the parts which became useless under normal service, because of any defect in material or workmanship (although there was no defect in the particular parts which had so broken, and although there was no defective material or workmanship in such parts,) if they gave way because of defective material or workmanship existing in other and different parts of the chassis. The parties contracted for the sale and purchase of an automobile. If the bearings burned out it became equally inefficient, whether the defect causing the condition was in the bearings or in other parts of the machinery. If the fact was established that because of a defect in the crank case the bearings wore out in two months under normal use, the defendant could demand of the plaintiff their replacement or delivery, according to the contract, to the same extent as he could if they wore out in the same time because they were themselves defective.

Although the bearings did not fall apart or separate into pieces, they wore or burned so as to be imperfect, and, therefore, were broken within the meaning of the agreement. The word "break" was not used in this clause of the contract in the limited sense signifying a separation into parts or fragments as a result of stress or force; the word was used in a broader sense, indicating a weakness, impairment or destruction of parts, however caused, if resulting from the defects mentioned.



Success and Individuality

Every marked success in this world is caused by a man or a woman of unusual personality, real individuality.

ALSO, behind every marked success you will find a man or a woman who refused to be satisfied with ordinary, commonplace results. So, you see, success, personality, individuality and zeal for superiority go together. And that's why successful people possess superior and individualistic homes and motor cars.

Open Cars
\$2685 to
\$3500

Closed Cars
\$3000 to
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In motor cars the Winton Six most fully meets the ideals of superiority and individuality. Its mechanical construction is time-tested and proved. And its designs, appointments and color harmonies avoid the commonplace, because each Winton Six buyer gets precisely the effect his personal taste prefers. Our artists are keen to produce for you a car that embodies your individual ideals—a car to make your wishes come true. Simply telephone or drop us a line.

The Winton Company

131 Berea Road, Cleveland

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are unequalled for motor lubrication, freer from carbon, economical because they protect the motor against mechanical wear, and the quantity required is comparatively small.

These are the claims of thousands of motorists,—some with years of experience, who want full value, and more who know the value of high grade lubricants, and who know when they obtain satisfaction.

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**A grade for every type of motor.
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1132 W. 37th Street

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Eleventh Annual
**Touring
Number**
*Mailed
June Tenth*

**The Most Comprehensive Guide and
Touring Book for Owners**

The touring editions of the AUTOMOBILE JOURNAL have been used for years by car owners and those connected with the trade. These numbers are replete with information for touring all parts of the country. They are complete, authentic, always dependable and revised to the minute.

No motorist who has used it wants a substitute. It is found in cars, garages and service stations wherever there are highways in America.

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Advertising in this edition brings quick results; its influence maintains during the entire touring season. And all this for the one expenditure.

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Page (type) 10x7½ inches, two columns to page. Price, one insertion: Page \$100; Half Page \$55; Quarter Page \$32. Printing in colors \$30 per page additional a color.

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AC

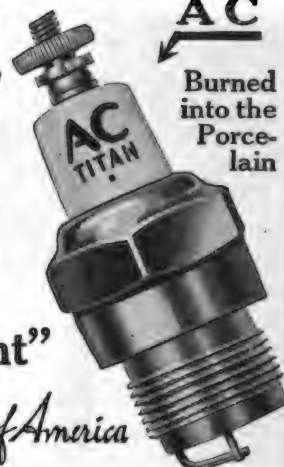
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The Standard Spark Plug of America

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Is Your
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Equipped
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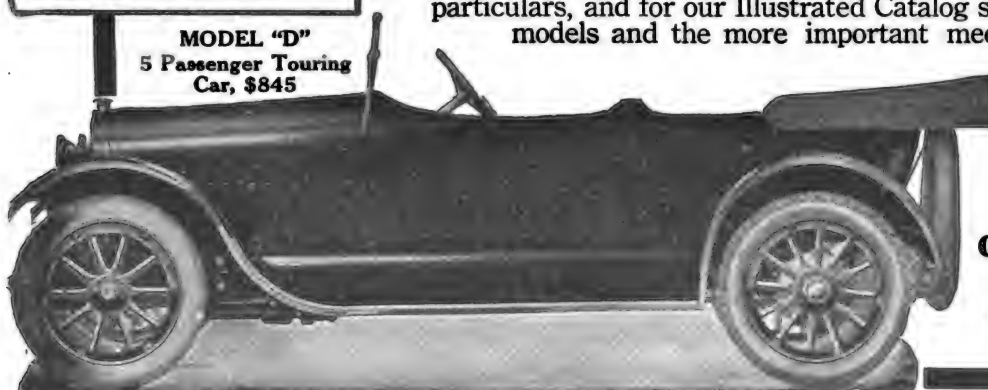
ELCAR

The Elcar at \$845 Does Its Own Talking

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Wheel Base—As long as some cars selling up to \$3,000 and more—115 in.
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5 Passenger Touring
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Looks better than its price, and is just as good as it looks. A car of distinctive beauty, well designed, well built, well finished—a car in which quality speaks right out.

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Two Passenger Roadster**

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BUT THIS YEAR it is almost hopelessly so. For motor trucks as well as for automobiles—sixes as well as fours.

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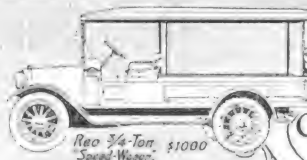
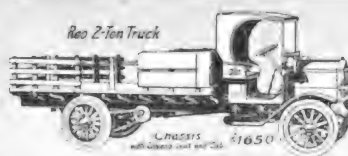
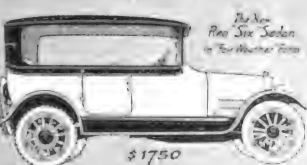
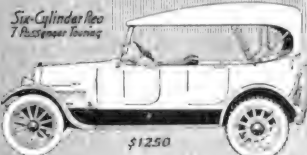
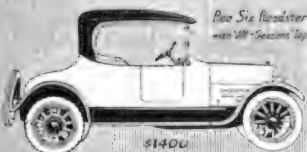
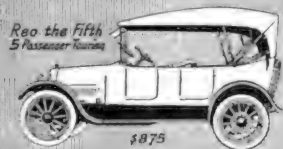
JUST REMEMBER this condition next season when planning for the future and selecting the line that you want to handle—permanently.

IT MAY NOT BE possible to get the Reo line—depends where you are located and how satisfactorily we are represented there now.

BUT THE WISE DEALER keeps his eyes open and his ear to the ground—you never can tell!

Reo Motor Car Company
Lansing, Michigan

185



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AUTOMOBILE JOURNAL

Entered as second class matter, April 15, 1894, at the Postoffice at Pawtucket, R. I., under act of Congress of March 3, 1879.

Ten Cents a Copy

FOR the Tourist the Eleventh Annual Touring number of the Automobile Journal, which will be issued June 10, is an event this year of more than ordinary importance. It is permissible at this time to give some inkling of what is coming, although little could be conveyed in this brief space to its entirety. The number will be, however, a combined national route, guide and touring book, containing special maps and replete with illustrations of what to see and where to see it. Valuable recreation and camping information will be included and the trips and tours indexed for quick reference. The edition will include feature articles that will appeal to men and women who tour and will, all in all, be handy.

THE Pages of the Automobile Journal are always valuable and interesting from cover to cover. This refers not only to the special articles, but to the departments of Queries, Accessories and Manufacturers' Notes. Readers scan the advertising pages with exceptional profit to themselves. The editors feel that they have the co-operation of the readers all the time in compiling the magazine. Just to get a little closer, however, we are this issue propounding a prize question. The details will be found on page 42.

BESIDES Many other valuable articles, the May 25 issue will contain a story on the advent of the racing season, with news of the drivers, details of the cars and other up to the minute data.

SUBSCRIBERS When giving notice of a change in location should, without fail, supply the old as well as the new address. This will save much time and guard against the interruption of delivery of succeeding issues of the magazine.

VOL. XLIII.

MAY 10, 1917.

NO. 7.

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Treasurer . . WILLIAM H. BLACK
 Secretary . . . D. O. BLACK, JR.

Published the 10th and 25th of each month by the

AUTOMOBILE JOURNAL PUB. CO.
 Times Building, Pawtucket, R. I.

IN THESE Times when recruits are marching off to war and the conscript and war revenue bills are on their way through Congress, when the automotive industry is rising to its great opportunity in mobilizing all the mechanical aids which a warring nation will require, when the matter of a sufficient tax is paramount, and the only difference of opinion is in regard to the size thereof, the reading that men, women and children do is one of the most important things in life. The wisest thinkers of the day say "Keep on with business as usual." This means, of course, to neglect no opportunity to forward the best interests of this beloved democracy by maintaining an excellent mental level. Be prudent; not parsimonious. Patriotic, not hysterical. Be Americans. Let the American way of conducting big enterprises, maintaining big industries, doing big things, lead the world out of its chaotic state of war into the blessed paths of peace through the cheerful giving by every one of the best that is in them, even though it be, as Destiny has ruled, over the hard road of armed conflict.

THE Current issue of the magazine brings good reading to all automobile owners, as well as every interest in the trade. People would be lax in their loyalty who at this time gave their attention to reading anything but the highest class informative, instructive, necessary material. So this issue is opulent with touring, legal and economic information in all departments. It is idle to enumerate here. The official news of the National Automobile Association, the second plan in the series of garages, two whole pages in the department of fashions, are, however, some of the expansive features which none should miss.

UNIVERSAL TRUCK ACCOUNTING SYSTEM

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It affords every detail of time and work of any number of machines, the labor, operating cost, revenue and earnings, with comparisons for any period, in one record book and day card for each truck.

The simplest and most comprehensive record ever conceived, adaptable for use with any method of house bookkeeping or independently, that can be made to serve as part of any method of accountancy.

The most intensely practical system of accounting ever devised, that can be maintained by a girl clerk and which has no limitations.

When you know the exact cost of truck operation and what is earned through the use of any vehicle, you have data of the greatest practical value.

Detailed information at request. When writing state number of trucks in use.

The Motor Truck

TIMES BUILDING

PAWTUCKET, R. I.

MOTOR TRUCK

Construction

Operation

Maintenance

Repair

Care

PRICE ONE DOLLAR

A work that is complete, wholly practical and deals with all subjects as the title implies.

**Truck Care
Truck Repair
Truck Operation
Truck Maintenance
Truck Construction**

Prepared for
**Owners
Operators
Repairmen
Salesmen**

\$1.00 the copy. In combination with a yearly subscription to **Motor Truck** (the great national authority on highway transportation, issued monthly) **\$2.00**.

This is the only book published dealing with business wagons, it is fully illustrated and represents a wonderful value.

THE MOTOR TRUCK
Times Building Pawtucket, R. I.

GETTING FOREIGN BUSINESS

THERE are today a large number of American manufacturers of motor vehicles who are doing a most satisfactory business in foreign countries. Even as conditions are today, these keen, farsighted, opportunity grasping, progressive concerns are rapidly perfecting selling channels which will permit them to dispose of a very considerable part of their output.

American products are already established in all foreign countries as standard goods, the best that can be produced. Thousands of foreign trade distributors are specializing in lines that are produced in this country. These are concerns that are well established. They are in a position to transact a large volume of business. This means certainly and distinctly that they can afford service to the buyers in their home field which will compare favorably with the service which domestic distributors supply to their patrons in this country.

Generally speaking, such connections in a foreign country are cash buyers, and, as they are now looking to America as the logical country to supply their needs, it is the opportune time for the producers in this country to explore foreign fields and reach all of the dealers who are in a position to place orders.

TRADE POSSIBILITIES UNLIMITED

The market of the world will soon be open to American manufacturers. It is waiting for American products. It is waiting for American service. There should not be an instant of hesitation. There is nothing mysterious in the act or details of entering into foreign business. The opportunities are unlimited. It is certainly the foresighted manufacturer who is now busily engaged in establishing his lines in the foreign field. Most emphatically he is establishing them on a permanent basis, almost as soon as he has made a beginning.

The way to enter foreign trade is simple. Not as an auxiliary, but as a direct channel, the Foreign Trade Bureau of the Automobile Journal opens the markets of the world to manufacturers. This bureau now enjoys a large membership, including concerns that produce vehicles, parts and equipment. Those who are affiliated with the Automobile Journal Foreign Trade Bureau are in direct touch with more than 8000 foreign dealers, in more than 85 foreign countries. Membership in this bureau is free to advertisers in the Automobile Journal. The great advantage afforded is that all members operate their own foreign departments, yet at practically no additional overhead.

REACH ALL BIG TRADE INTERESTS

The concerns and individuals reached by the members in this bureau are the leading distributors in their respective countries. Most of them are what we would term importing jobbers, as they buy to sell again and to place lines with dealers who do not import products. This affords the members of the bureau the distinct opportunity to reap golden benefits through the zealous selling efforts of thousands of small dealers whom they could not reach in any other way than through this bureau.

The service is simple, complete and efficient. Besides constantly increasing in its worth to members, it supplies an immediate asset to any manufacturer of great value. It possesses result-producing factors that makes it a big feature in connection with any business that uses it.

The bureau is conducted under the personal direction of T. Wesley Wright, with offices in New York City. His services are free to members. Mr. Wright is without question one of the best informed export men in America. He has developed this bureau to a degree of efficiency that makes it a business proposition of magnitude, wholly serviceable, worthy of the utmost confidence, and that will bring a magnificent reward to those who utilize it. The American manufacturer must realize that a foreign department is the best promotion feature of the day and hour. The time to develop the foreign field is now.

The Automobile Journal

MOTOR, THE GIANT OF THE WORLD WAR

Prodigious Labors of Modern Fighters Made Possible by Automotive Aids—Miraculous Feats in Battles and in the Trenches Carried Out by Countless New Tractive Schemes.



Latest Military Portable Searchlight, with Tower Lifted by Power Machinery.

WHEN posterity looks into the pages of history to read about the Great War, the feature that will loom up above all others is the fact that this period will be identified as the epoch of the internal combustion engine and, in all departments of the great war machines, this has been the salient and most important agent in controlling and guiding the activities in the commissary, transportation and munitions department.

It would be difficult to imagine the present conflict on so gigantic a scale without the agency of the gasoline motor. In fact, it would have been impossible without the motor car, which has made it possible to mobilize the enormous numbers of men at different points and keep them supplied with food and munitions.

An attempt to visualize the conflict immediately brings to the mind the caravans of motor cars moving over the roads

in France, the aeroplanes, the submarine chasers, the tractors hauling the immense howitzers, the "tanks," armored cars and other vehicles propelled with the internal combustion engine that are immediately associated with the vast activities that are necessary to maintain the campaign.

Tractive Giant Awakes to Task.

The war sprang up so quickly and developed so rapidly that engineers had not foreseen the great part the motor car was to play in modern warfare, consequently, no great progress had been made in developing the motor vehicle strictly for war purposes. The result was that thousands of machines that were built in this country, intended for the purposes of pleasure and business in times of peace, were sent across the ocean and put into service in a varied line of work. Many were made over to fit them for special service. Emergency uses quickly developed into routine. What was begun more than two years and more ago is going on now and more intensified than ever. Some are used for mounting light field pieces and armored; thousands have been turned into ambulances; other thousands are in the commissary department to keep supplies moving to the trenches, while many pleasure cars are retained in their original form for use of officers, dispatch carriers and signal work. Portable machine shops, wireless stations, searchlights and telephone stations are fitted on truck chassis.

While the gasoline engine is propelling the terrifying

British tanks toward the German trenches, it is also propelling the fleet airplanes far overhead; pulling the great field pieces into position to back up the advance and bringing forward the ammunitions. Motors whirl reinforcements into line while the long caravans of motor ambulances carry the wounded to the rear.

French history will record in glowing terms the service of the motor car in saving Paris from the ravages of



Typical Field Ambulance of Powerful and Rugged Build in the Service of the Defenders of Democracy.



Canadian Regiments Carry Their Own Special Machine Shops on a Truck to Serve Their Other Trucks.

the foe, it being the instrument through which French generals were enabled to maintain and supply their garrison at Verdun, checking the advance of the Germans. On the highway leading out of the besieged city for a distance of 90 miles a continuous stream of motor cars flowed night and day for several months laden with ammunition, supplies and reinforcements. Thousands of trucks were in the caravan, moving only a few feet apart and carrying tons of the deadly missiles that stopped the Crown Prince's attempt to reach the city of Paris. No other system of transportation could have handled the enormous quantities of material so efficiently and promptly. It would have been an impossible undertaking with horses, as they can only work a small part of each day, require constant attention and are easily disabled. The trucks run continuously and despite the severe conditions and great strain prove equal to the task.

When new lines of offense or defense are established the gasoline motor driven trench diggers are put to work and it is a common sight to see scores of these converted trucks excavating long trenches where the men take refuge from the hail of shot and bursting shells.

Napoleon said "an army travels on its belly," and back of all this activity at the front is the most necessary and important work of all, providing the armies with food. And here again the gasoline motor is found doing its bit, chugging along the furrows on the farm, turning up the soil for planting. When the crop is raised the motor driven harvester machine will be put in the field to harvest the crops and later



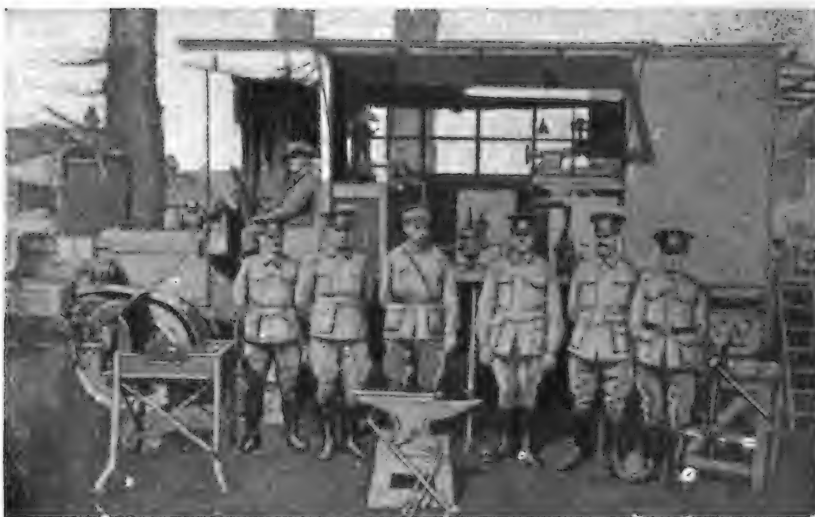
Caterpillar Tractor for General Haulage as Employed in the Field by the United States Army.

the motor trucks will carry the produce to shipping points to be picked up later at the theatres of the war by other trucks and carried to the field kitchens.

The soldiers that are relieved of this unpleasant task of digging the trenches will never forget the welcome sight of these machines cutting the deep ditches across the fields.

When all the nation is on the move in the tasks of war, which is the state to which practically the whole world has now been brought by the spread of it from continent to continent, all that there is in life is involved in the transport of men and materials from place to place. Humanities and necessities come first; luxuries and pleasure are forgotten, although administration of a comfort and a convenience wherever possible is not overlooked.

When there is war there are men wounded. When men are wounded, from all the dictates of humanity and service, they must be moved and cared for. Ambulance work proves both a high duty and a branch in which many advancements have already been effected, aside from the courage and hero-



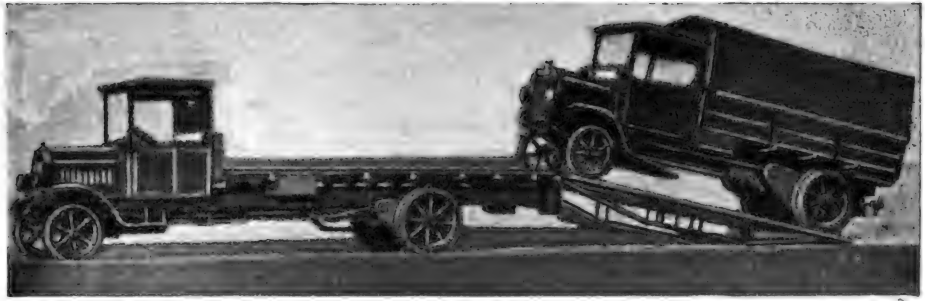
Field Repair Shop Constructed on a Motor Truck and Used by Forces of the Australian Expedition.

ism of the hard workers in that arm of the service. To the credit of superhumane instincts it is noted that in this branch provision has also been made for exhausted and wounded horses which are carried from the battlefields by their successors in the haulage work of the world, the new mechanical tractive giants which consume gasoline and know no fatigue.

When the world went to war this time, it found, in other words, that it was under necessity of taking all its inventions and mechanical contrivances with it. In the days of the ancients, pugnacious men had enormous war machines, but their weakness was their immobility. Never has there been an upheaval amongst the nations in all the history of the world when success or failure, life or death, depended so utterly upon the powers of motion known to the races of the earth. The immensity of the problems of equipment serve to divert horror stricken humanity from the sad deaths and awful suffering which otherwise would be shrouding the earth in an inky black pall of gloom.

Aside from ammunition and miscellaneous hauling there are many special types of machines. Only an incomplete enumeration can give mention to trucks carrying light field guns, aircraft guns, machine guns, entrenching tools, observation balloon tenders, field searchlights, field wireless telegraph stations, field telegraph construction material and apparatus, signal corps equipment, all of which are absolutely necessary at or close to the actual line of battle or defense. Behind this line is the long files of ordinary express trucks operating out of the main supply base from which distribution is made to the different stations from which further distribution is made to the firing or first line of defense or offense in the battle order.

Food is prepared in field kitchens and sent to the front;



Damaged Transports of Germans Are Taken to Repair Stations on a Specially Designed Wrecking Truck.

fighting line; medical and surgical supplies and equipment of all kinds in sufficient quantities to meet any emergency make heavy demands on portage.

Every mechanical arm of the service must have traveling smithies at hand to care for their equipment, and this applies to the very teamsters themselves, as well as all other branches under the care of quartermaster-generals. There are portable repair shops mounted on motor trucks for work on arms of



the base hospitals are behind the line at a distance to be out of the range of effective fire, yet ambulances must be kept in constant operation no matter what may happen between the base and field hospitals. Everything that will save human life that is known to medical science is kept at the hand of the doctor and surgeon. There is fumigating

and sanitary equipment rolled to the scene in motor cars; portable field hospitals are equipped to treat cases that demand immediate attention close to the actual

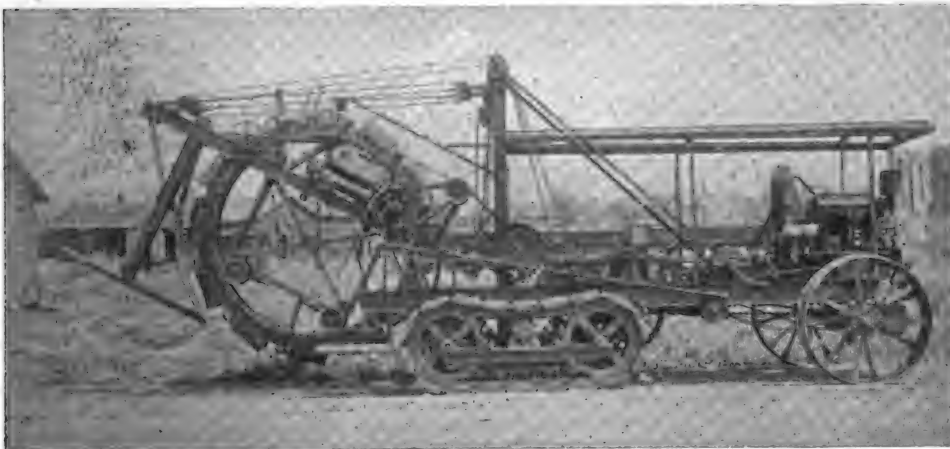


Several Types of Automotive Equipment: Upper Left, Express Body Used in the French Service; Upper Right, Italian Transport with Bulk Freight; Lower Left, Russian Army Truck Mired; Lower Right, a Train "Somewhere in France."

all kinds; portable machine shops and stocks of parts for the repair of trucks and cars; portable vulcanizing plants to repair tires; portable tire presses for the removal and replacement of truck tires; portable blacksmith shops and portable stores of clothing, arms and general equipment.

From a long range view it is at once evident that steamships and steam railroads, or railways operated with electromotive power, as the case may be, are the long hauling factors of the world war. The short haul agent, in this comparative sense, yet one that has capacities also for very long hauls if need be, is the automotive vehicle, the most recent product of man's ingenuity in transportation.

The great part played by the automobile in this war—the mere carrying of officers has doubled or tripled commanding efficiency—is as yet only faintly understood.



Trench Machine, Which Will Dig 1000 Feet, 18 Inches Width and 48 Inches Depth, in 10 Hours, Doing the Work of 25 Men.



Divided Front Seat Touring Car of the Inter-State Series, Popular and a Masterful Color Creation.

THE latest offerings of the Inter-State Motor Co. of Muncie, Ind., include five different pleasure car models and one delivery wagon model, interchangeable for the same chassis.

A standard roadster at \$875, a four-passenger roadster at \$950, a standard touring car at \$925, a touring car with divided front seat for \$940 and a Touring Sedan with convertible winter to summer top, having removable windows and posts and priced at \$1325, completes the line of pleasure cars. As an addition to the pleasure car types for the commercial trade a delivery wagon having a capacity of 850 pounds is offered.

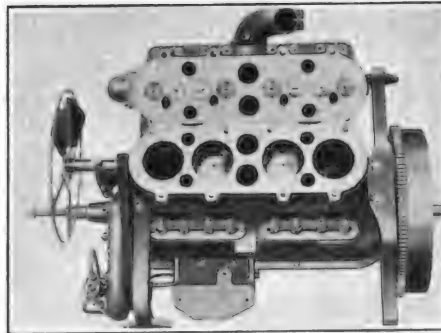
Fuel economy is one of the features claimed for this car and the manufacturers attribute it to the four-cylinder, valve-in-head engine which has been designed not only to furnish power, but to operate economically and with flexibility.

The cylinders which are integral with the upper part of the crank case are cast en bloc, forming a compact and rigid unit, and having a bore of $3\frac{1}{4}$ inches with a five-inch stroke. Though the S. A. E. rating allows but $19\frac{3}{5}$ horsepower for this engine, the actual output is somewhat greater on account of the engine speed when in operation. A detachable cylinder head which is cast with

large cored passages for water circulation, affords access to the cylinders. Close grained gray iron is the material used for the piston castings, each of which is fitted with three eccentric split rings.

Two-Section Crank Case.

In order to give complete accessibility



Valve in Head Motor.

to reciprocating parts, as well as the lubricating system, the crank case is made in two sections, in the upper, which is integral with the cylinders, are carried the crank and camshafts. The lower portion forms the oil base. Carefully balanced to eliminate vibration, the

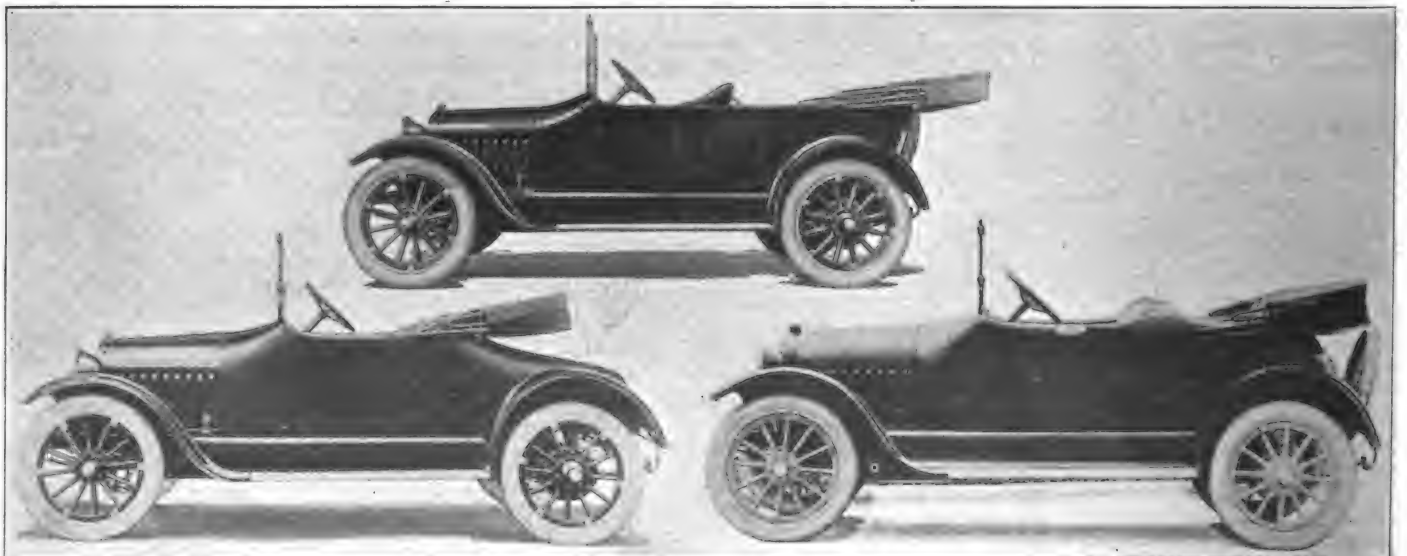
Interstate Fine Sedan Among

crank shaft of .45 carbon steel, is mounted on three large bronze back, babbitt lined bearings, which are hand scraped and provided with shims of different thicknesses. The front, centre and rear bearings are $2\frac{1}{4}$, 2 and $3\frac{1}{4}$ inches long respectively. A notable feature here is the long rear bearing, which is so made to carry the weight and strain of the fly wheel.

The connecting rods, which are made of .35 carbon steel, are drop forged and double heat treated. The bearing caps are fastened by two $7/16$ inch special bolts, which are securely locked in place. The piston pin end has a bronze bushing in which is machined an oil groove for proper lubrication. The piston pin fits snugly into the piston and is locked into place by a special locking device. Operating on three liberal sized bearings, the $\frac{1}{2}$ inch camshaft, with cams integral, is fitted in such a manner as to have end thrust taken up by a special adjusting screw from the front of the engine. Located in the cylinder head, the valves, which are $1\frac{9}{16}$ inches in diameter, are made of the finest material to prevent warping and pitting, and are actuated by means of ball joint push rods from the camshaft and are easily accessible for adjustment at the top of the engine. Practically all of the valve mechanism is enclosed in a removable dust proof cover.

The Lubricating System.

Lubrication is attained by means of a circulating splash system. Immediately above the oil reservoir, in the base of the crank case, an oil tray is placed, into which the connecting rods dip at every



Upper Model, Inter-State Five-Passenger Touring Car; Model at Left, Standard Roadster; Right, Four-Passenger Roadster.

Discloses a Summer Latest Cars

revolution. The supply of oil is kept up by a gear driven pump, which circulates the oil through a distributor tube to the oil tray and also to the timing gears. The oil then drains back into the reservoir.

On account of the block design of the cylinders the water jacket space in the engine has a large cooling area, through this the water is circulated by the thermo-syphon system into a honeycomb type radiator. A belt driven fan circulates the air through the radiator and assists in radiation. Mounted high enough for easy adjustment a model R Schebler automatic float feed type carburetor controls the fuel supply in the engine. It is hot air jacketed from the exhaust mani-



Wide, Roomy Seating Arrangement in the Four-Passenger Roadster.

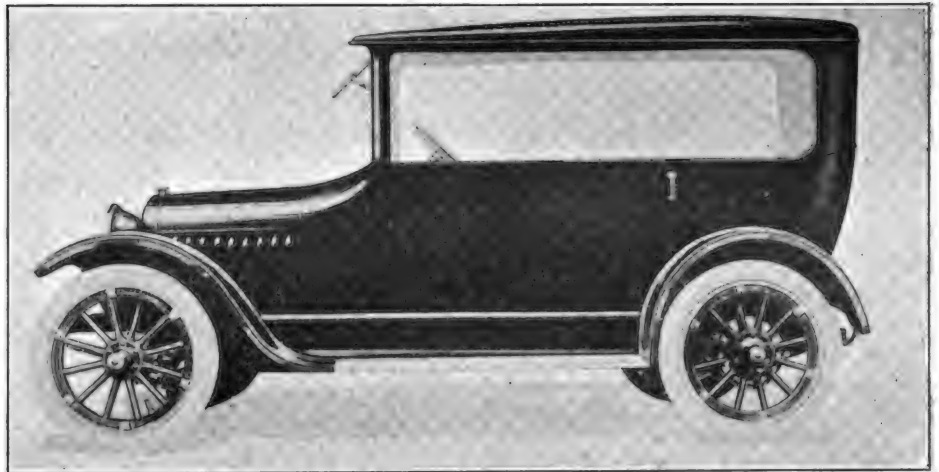
fold and the auxiliary air valve is controlled by an adjusting lever on the dash, which permits of especially easy starting in cold weather. Gas supply is controlled by a manually operated lever on the steering wheel and a foot accelerator between the brake and clutch pedals. From the carburetor the mixture passes to the cylinders through an intake manifold of special design. After reaching the cylinder block the gasses are heated by a hot water jacket to the combustion chamber.

Ignition is furnished by the Remy battery system and controlled by a lever located on the top of the steering wheel.

Clutch Mounted High.

The clutch is of a special cone design and is mounted inside the flywheel. Adjustable spring inserts placed under the leather facing make it possible to secure quick adjustment.

From the clutch the power is transmitted through a universal joint and drive shaft to the transmission gearset, which is located on the rear axle. This unit is of the selective sliding gear type,



Springfield Sedan Model, Showing Windows and Posts Removed for Summer Touring; Listed at \$1325.

three speeds forward and reverse, securely anchored to the axle by a wide flange and operated by pull rods to the gear shift lever on the driver's right. The gears are six and eight pitch and all clash gears have $\frac{3}{4}$ inch face and are of nickel steel, case hardened. The constant mesh gears are of .40 carbon steel, case hardened. The main bearings are double row ball and Hyatt High Duty roller type, those on the countershaft are single row ball.

The rear axle is of the $\frac{3}{4}$ floating type, with a gear ratio of four to one. Hyatt High Duty bearings are used throughout. A large cover at the centre of the housing when removed gives access to differential for adjustment.

For the front axle a one-piece I section, drop forged member, made of high carbon steel, is used. This member is mounted on semi-elliptic springs 36 inches long and $1\frac{1}{4}$ inches wide. The rear springs are three-quarter-elliptic, 46

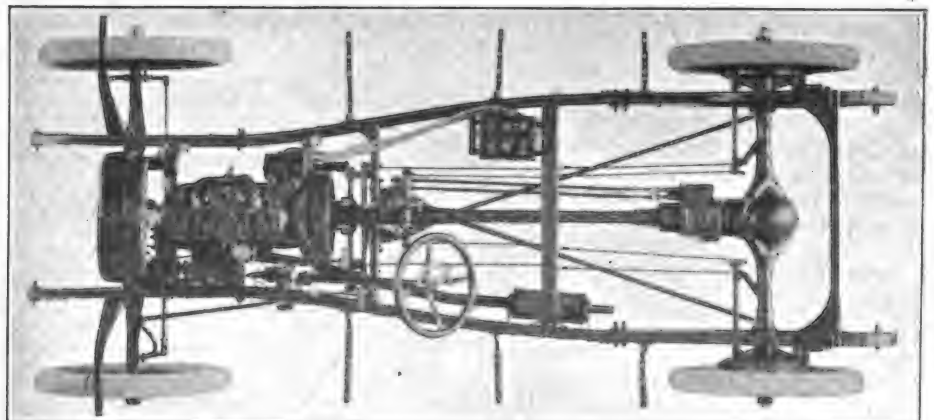
inches long by two inches wide, and are underslung on the rear axle, located as close to the rear wheels as possible. This construction is designed to minimize the side sway of the car.

Frame with a Bottle Neck.

Of bottle neck construction, by which the smallest possible turning radius is secured, the frame is of pressed steel channel section. The side members are $3\frac{1}{2}$ inches deep by $5\frac{3}{32}$ inch thick. It is rigidly braced by four cross members and the side members follow exactly the outline of the body. Fender brackets, step hangers, etc., are securely anchored to the frame by means of a hot riveting process.

The wheels are made of hickory and are of the artillery type, 12 spokes in each wheel, each spoke being $1\frac{1}{4}$ inches thick. The wheels are equipped with Firestone demountable rims and 33 by four-inch Goodyear oversize tires, all weather tread non-skid type is used on the rear.

The gear change lever, as well as the emergency brake lever, are located at the centre of the car. The emergency brakes are internal expanding on the rear wheel drums. The drums have a diameter of 12 inches and are $1\frac{1}{4}$ inches wide. Current for ignition, starting and lighting is furnished by a Willard storage battery located under the driver's seat.



Plan View of Inter-State Chassis, Showing Powerful Motor and Rugged Cross Members.

War Revenue Act Raises Strong Opposition

Proposal to Place Five Per Cent Tax on Selling Price of Automobiles
Stirs Manufacturers to Protest—N.A.C.C. Declares Measure Confiscatory

Text of Bill to Tax Automobiles

The section of the War Revenue bill that has been adopted by the Ways and Means Committee, relative to the taxes proposed on automobiles, reads as follows:

"Sec. 600. (A) Upon all automobiles, automobile trucks, automobile wagons and motorcycles and automobile, motorcycle or bicycle tires (including inner tubes) sold by the manufacturer, producer or importer, a tax equivalent to five per centum of the price for which so sold; provided, that from the tax which otherwise would be imposed upon a manufacturer, producer or importer of automobiles, automobile trucks, automobile wagons or motorcycles, there shall be deducted the amount of any tax imposed by this subdivision upon the tires used thereon.

"Sec. 601. That each manufacturer, producer or importer of any of the articles enumerated in section 600 shall make monthly returns under oath in duplicate and pay the taxes imposed on such articles by this title to the Collector of Internal Revenue for the district in which is located the principal place of business."

THE war revenue act now before Congress, if passed, will create an unusual situation in the automobile industry, as it will mean an advance of five per cent. on all new automobiles and tires. Its effect will be particularly severe, as this advance comes at a most inopportune time, following as it does the recent advances in automobile prices, forced by the high cost of materials. As the manufacturers were compelled to make these advances owing to the narrowing margin of profit, it is but to be expected that the purchasers will have to shoulder the tax should it be levied. Tire prices have also been advanced from 15 to 30 per cent. since the first of the year; further advances were being considered by the large companies and an additional five per cent. will have to be added to the price to cover the tax, as the makers have also been operating on a very narrow margin of profit, owing to the enormous advances in all the raw materials that enter the manufacture of the finished product.

N. A. A. C. Opposes Tax.

The National Automobile Chamber of Commerce and the Motor and Accessory Manufacturers took prompt action in opposition to the tax of five per cent. on the selling price of automobiles, proposed as a means of raising war revenue. A state-

ment of facts regarding the situation in the automobile industry and why it does not warrant an almost confiscatory tax was sent to every congressman by the National Automobile Chamber of Commerce. The statement, which was gotten up as a two-page folder and signed by Alfred Reeves, general manager of the chamber, was as follows:

Automobile manufacturers without exception desire to pay their full fair proportion of the government's expense. They want to be taxed fully and in proportion to all other industries.

They do object, however, to having double taxation imposed upon them or any form of taxation that may put dozens of them out of business.

There are 450 automobile makers in the United States, of which 12 makers produce 80 per cent. and 438 produce 20 per cent. of the whole. The 12 have been prosperous, while the bulk of the others are able to exist only in good times. The prosperity is due to increasing volume, the reverse occurs when the volume shrinks.

Volume of Sales Down.

Since the war was declared the volume of sales has been seriously affected. This condition continued will change the volume and hence the profits.

To further and individually tax an industry with such a condition existing is unfair and unjust. Such a tax would have to be absorbed by the maker. Any advance on a declining market would further restrict sales and hence volume.

This condition would most seriously affect the small and the financially weak companies.

This industry has been obliged to increase its cost for labor 25 per cent. and material more, as indicated in the appended list. These costs have been overcome to some degree only by the great volume.

These increases were:

Sheet aluminum.....	40%
Steel castings.....	30%
Bearings.....	35%
Aluminum castings.....	50%
Leather.....	30%
Stampings.....	75%
Sheet steel.....	65%
Tungsten steel.....	400%
Steel tubing.....	40%
Iron castings.....	35%
Forgings.....	75%

Profits in Trade Unequal.

The automobile industry comprises approximately 450 manufacturers and 825 makers of parts and accessories. There are 25,924 dealers and 23,686 garages throughout the country, all depending on the products of the makers of motor cars.

Few of the 450 manufacturers are, we believe, averaging to exceed 12 per cent. profit on their turnover. The five per cent. tax would, therefore, take 5/12ths of their profits (assuming the tax cannot be passed on to the consumer) which would equal 5/12ths or 41.6 per cent. of the profits of the trade as a whole. It would be the equivalent of a tax of 41.6 per cent. on entire net profits.

The five per cent. tax cannot generally be passed on to the consumer. It is impossible to advance prices on a falling market. Very few manufacturers after paying this five per cent. tax would have anything to pay under the excess profits tax. Their profits remaining, if any, would be less than eight per cent. of their investment.

The official reports show names of more than 600 automobile manufacturers that have failed during the past five years.

We believe that not more than one-half of our automobile manufacturers are breaking even. Few are making in excess of 10 per cent. on their turnover.

Top Notch Material Costs.

Material costs have gone up and are going up enormously.

Prices have been driven to absolute top notch by high material and labor costs.

Profits are probably not more than three-fourths what they were a year ago.

During the past year, excluding Ford, 80 per cent. or four-fifths of all new cars were sold to people who already owned cars and traded them in. If the five per cent. tax is imposed these people will largely keep their old cars instead of replacing them with new. Manufacturers will suffer seriously in their sales and the government's proposed revenue from excess profits taxation will not materialize.

The automobile business has already suffered curtailment through the declaration of war. Several thousand men have already been released from employment.

People will not freely buy automobiles in war times, or under heavy tax conditions.

Manufacturers have already begun to curtail output, which means manufacturing costs will go up inevitably. Reduction of output does not correspondingly save overhead which, next to material, is the largest element entering into the manufacture of cars and trucks.

We offer our services to supply further information and details regarding the statements made herein.

DOBLE CARRIES WATER FOR 1000 MILES OF TRAVEL.

One of the most objectionable features of former steam cars has been eliminated by Abner Doble, inventor of the Doble steam car, by his method of condensing all exhaust steam in a honeycomb type of radiator.

REST CARS PROVIDED FOR WEARIED HORSES.

An animal ambulance motor car, used to a considerable extent by the British army, is one of the unique vehicular results of the great war. Slightly disabled or fatigued horses are given humanitarian care and removed to veterinary hospitals in the rear of the army frequently and with good results. The side of the car is lowered for a runway.



British Animal Ambulance.



Gnarled Trunk of an Old Cork Oak.

From Cork to Gasket

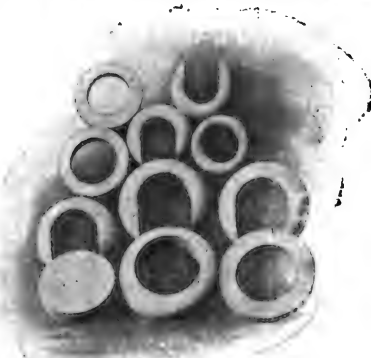
A Marvel of Nature and Industry

in the average motor car where the unique qualities found in cork have led to the selection of that material to serve a purpose that could not be filled with any other and give as satisfactory results.

Recognized by the ancients as peculiarly suited for certain uses, says a bulletin on "Cork: Its Origin and Uses," issued by the Armstrong Cork Co. of Pittsburg, time has vindicated their verdict. At present there is nearly \$5,000,000 worth of crude and manufactured cork imported into this country annually. The cork oak or cork producing tree is found throughout the Mediterranean countries, with Spain and Portugal the leading producers. In Algeria, Southern France, Corsica, Italy, Sardinia and over in Morocco the cork oak is also found, but it has not been husbanded as in the two former countries, particularly Spain.

These trees vary in height from 20 to 60 feet, according to age, and are ready for stripping when 20 years old. The "cork wood," which is the outer bark of the cork oak and from which the cork of commerce is obtained, is of little value when removed from a virgin tree, but this removal does not kill the tree and a new sheathing of bark is ready for stripping in from nine to 10 years. This second stripping is of better quality than the virgin stripping, but not as valuable as the third and subsequent strippings, which are made at intervals of about nine years, as each successive growth on the same tree develops a finer and consequently more valuable grain or fiber. From the age of 40 up to 100 years a tree produces its best product.

The progress of cork from its native forests to the great automobile and other shops of America makes a story of much picturesque and mechanically engaging interest. The bark, which is from one-half to 2½ inches thick, is removed from the trunks of the trees and larger branches, care being taken not to injure the inner bark. A yield of from 45 to 500 pounds per tree is obtained. It is left on the ground for several days to dry, after which it is packed up and placed on the backs of burros or in wagons to stations, where it is subjected to a boiling process



Above, Carburetor Floats; Below, Washers and Gaskets Made of Cork.

ONE of the most picturesque and least suspected of the many materials which are used in the complete, modern pleasure car, is cork, a vegetable product from far-away sunny Spain, when considered in the light of its balmy climate and many charms lavished upon it by bountiful Dame Nature, the land of serenades, poesy and delights. Lowly in its intrinsic value as cork may be, its general use in the arts and crafts has been common for many centuries. Man has taken this pliable vegetable matter and worked it into many forms for useful purposes. For use by the apothecary and in the household it has long held a distinct primership, but mechanically it obtained little recognition until it has come recently into extensive use in the automobile world.

The motorist who steps into his car laid with a cork linoleum, throwing in a cork-faced clutch with his cork innersoled shoe and glances at a dial which through the use of a cork float, indicates the fuel level, would become profoundly interested in this great gift of nature if he but tour to the romantic land of the cork trees along the Mediterranean, reminding himself as he went that the cork float in his carburetor was giving a proper feed to the engine and that the power was being kept at its maximum by the cork gaskets, while a minimum of vibration noises were heard owing to the muffling effect of the cork washers. A way along on his route he might take the cork from his cork packed thermos bottle filled with the aromatic wine of the cork producing country and pour a libation to Dame Nature for her gracious bounty to the grand vales of Andalusia and the vast, blessed cork forests of Old Castile. In this array of cork uses the many polished parts of the automobile which received their smoothness and finish from the polishing properties of a cork buffing wheel back in the factory must not be forgotten. In fact, there are between 50 and 60 different places and points



Pile of Bark in the Forest.

after being allowed to season for a few weeks.

After the bark has been boiled and scraped to remove the useless outer coating, it is soft and pliable and can be packed in convenient bundles. After being sorted and rebaled the cork is ready for export to this and other countries, where it undergoes the finishing touches or processes that prepare it for the arts and crafts. At their Pittsburg factory, with many interesting processes, the Armstrong Cork Company produces a number of its specialties for automobiles.

Cork in its natural state is used to a considerable extent in manufacturing specialties for automobiles, but research work and tests has shown the manufacturers that a composition of cork is far more serviceable as a material for use in certain cases. This composition is used in the manufacture of gaskets and is not affected by oil, gasoline, grease or water. In fact, any of these liquids can be kept in constant contact with this material and it will not disintegrate where the temperature does not exceed 212 degrees. Another quality in the product is the elasticity, which remains the same as in the cork, but has been increased through the manufacturing process.

These qualities in the cork have made possible changes in structure in parts of automobiles making for greater strength and economy, as fewer bolt holes and bolts are required to accomplish certain results than were formerly used. When used between the crank case and oil pan the cork gaskets have been found to give excellent results, as they can be squeezed down at the bolt holes to the thinness of tissue, while on the stretches between the bolts the elasticity of the cork will take up any unevenness in the metal and assure an oil tight joint for the life of the car.

Gaskets of cork have been used for a number of years on cover plates for timing gears, carburetor intake manifolds, clutch and flywheel hand hole covers, transmissions, oil pumps, valve compartment and also to prevent hot water leakage between the top and bottom plates in assembled radiators on motor trucks, between pressed steel water outlet and inlet manifolds, baffle plates and engine head stampings. The cork washer, made of natural or composition cork, finds a place of almost equal usefulness in making the automobile. They are used to prevent rattling, to prevent the entrance of dust and the escapement of oil in stuffing boxes and around bearings.

Natural cork floats are found in several places on the automobile, as carburetor floats, on oil and gasoline gauges. Natural cork inserts have been used in disc clutches for a long while and at present engineers are experimenting with cork facings on cone clutches and full cork composition

facings on disc clutches. Early tests of this material in this capacity are giving very satisfactory results.

Linoleum being the most widely employed covering for the floors and also as body and chassis liners and pads, is a product made up of powdered cork, ground from the waste cork pieces, oxidized linseed oil and burlap. The cork of course is a product of the Mediterranean countries. This is mixed with a cement made from linseed oil and Kauri gum, which comes from New Zealand. The mixture is pressed onto burlap, which is made from the fiber of jute, grown in the swamps of Bengal, India, and sent to Dundee, Scotland, to be woven into the fabric. Coloring, printing and other finishing processes follow, after which the linoleum is hung up in big ovens to be dried and prepared for the markets.

In Spain and Portugal a large part of the annual yield of cork wood is turned into finished form in domestic factories. In fact, the manufacture of cork is the principal means of livelihood of thousands of families. The workmen cut the bark into small rectangular blocks from which the corks are rounded into shape by hand. Whether cut by the old hand method or by machinery, the amount of waste is surprising, from 60 to 65 per cent. of the cork being reduced to scrap. These scraps of cork, or "cork waste" as it is called commercially, are collected from hundreds of small factories throughout the cork producing countries and put in bales at plants maintained for that purpose; then forwarded to America for use in the manufacture of cork by-products.

PRISON LABOR ON ROADS IN WAR TIME.

The National Committee on Prisons and Prison Labor has repeatedly shown the value in employing convicts in road making. In North Carolina and other agricultural states this method of employing the convict is particularly advantageous.

The war brings the matter of the employment of unskilled labor on roads before the public again. Unskilled labor has become very scarce and expensive; yet the present crisis demands that the roads of the country be maintained in good shape to insure rapid transmission of products. The National Committee on Prisons and Prison Labor has begun a movement for the mobilization of the convicts of the country in a national and state service for the building and upkeep of good roads.

In this effort the committee will have the hearty support of the American Automobile Association through its good roads board, which includes a member from each one of the 600 odd clubs contained in the national body of car owners.



Spaniards Cutting Bark Into Strips and Squares.

Wolverine Eight Wins Way in New England



Alfred H. Sowers, Treasurer and General Manager Jackson Motor Car Co., Boston, Mass.

ONE of the most interesting phases of current automobile history is the success of the Jackson model, the "Wolverine Eight," in New England, and especially in Boston. From a common place position in this territory the Jackson car sprang almost overnight into a place alongside the foremost motor cars, and is rapidly becoming one of the most popular cars in Boston. First among the reasons is the car's quality; the second is the fact that the East has been "educated up" to the eight-cylinder ideas more than has the balance of the country, and the third and most interesting is Alfred H. Sowers, treasurer and general manager of the Jackson Motor Car Co. of Boston, New England dealers and distributors of the Jackson "Wolverine Eight."

Alfred H. Sowers, keen eyed, progressive, with a super-abundance of initiative, has so many good ideas that he frequently allows all the automobile dealers in Boston to share them. An active leader in everything pertaining to the automobile trade, he is one of the best known and most popular dealers in New England. Another of the individual factors which has made for the success of the Jackson Motor Car Co. of Boston is the interest which Howard A. Matthews, treasurer of the Jackson Automobile Co., has taken in it. Mr. Matthews finds time, aside from the business of manufacturing motor cars, to give personal attention to the Boston company.

Entering upon its fourth year in the building of eight-cylinder cars, and with 15 years of experience in the building of



Four-Passenger Jackson Cruiser, with 118-Inch Wheelbase, Including Five Wire Wheels, Priced at \$1495.

high class motor cars, the Jackson company feels that its efforts have reached their culminating point in this eight-cylinder model, which, the officials of the company declare, demonstrates conclusively that an eight-cylinder car of quality can be marketed at a moderate price.

There are four body designs in the "Wolverine Eight" series—the five-passenger touring car, the five-passenger sedan, the four-passenger cruiser and the roadster. Just a hint of raciness is conveyed by the lines of these new Jacksons, especially the roadster, and the cruiser with its sloping tonneau, neat seating arrangement and wire wheels as part of its regular equipment. The motor is a Ferro-Jackson and is first of the American V type, valve-in-the-head design. With an A. L. A. M. rating of 28.8 horsepower the motor shows in factory tests 50 horsepower at 2400 revolutions per minute.

In several respects the Jackson American V type motor differs from the same type motors of the European style of construction. The cylinders are of the I head instead of the L head construction, and are cut integral with the case instead of in separate blocks as in the European type. The valves are in the cylinder heads instead of being pocketed at the side as in the European V type construction. There is an individual cam to each valve, while in the European type the valves on opposite cylinders are operated by a common cam. The crank case is integral with cylinders instead of being of separate aluminum cylinders, as in the European build of engines.

The Zenith automatic carburetor is of the "twin jet" type, supplying two separate outlets of gasoline at the same time to the two sets of cylinders, and not requiring adjustment.

The ignition is single Remy with hand spark control. The Willard storage battery has a six-volt capacity. Other noticeable points are: Auto-lite generator, ammeter instrument board and oil pressure dial on dash. The stock equipment includes a one-man top of Dreadnaught rubberized cloth, made in the Jackson factory, a sloping rain vision windshield, dash lamp and electric horn.

The starter and unit power plant is

equipped with a Borg & Beck light operating disc clutch, operation of which requires a minimum of muscular exertion.

The rear axle is genuine full floating type with ball and roller bearings throughout, and the weight of the car carried entirely on the axle housing through Hyatt high duty roller bearings. The axle driving shaft is free from any load whatever, and may be removed from the axle by merely taking off the hub cap. The wheelbase is 118 inches.

GENERAL ELECTRIC'S NET WAS OVER \$15,000,000.

The General Electric Co., Schenectady, N. Y., made a net profit of \$15,294,091 in 1916 on sales of \$134,242,289. Additional profits of \$3,866,881 were realized from other sources. After deducting dividends a balance of \$10,000,000 remained for the year, or nearly \$7,000,000 more than the balance resulting from operations in 1915. Expenditures of \$8,828,254 were made during the period for additions to the plant.



Howard A. Matthews, Treasurer Jackson Automobile Co., Jackson, Mich. President Jackson Motor Car Co., Boston, Mass.

PLATE TWO

SEMI-FIREPROOF GARAGE SUITABLE FOR
TWO CARS

Construction of Stucco, with Wood Exterior, and Design
Includes One Pit and Much Room for
Repair and Maintenance Work

Design by the Architectural Department of the Automobile Journal Publishing Co.

This paper is the second of a series of articles on garage designs made by the Architectural Department of the Automobile Journal Publishing Co. All the necessary information is given in the text in a popular way and the sketches are so comprehensive and informative that readers desiring to use this design may, with or without the aid of a builder, proceed at once to do so.

THIS is a garage designed for housing two cars. Built in conformity to the architectural lines, according to the plans here shown and of the materials specified, there is no room to doubt that the structure will give ample satisfaction for housing facilities, for convenience of arrangement, simplicity and economy of construction. The dimensions are 19x20 feet and the cars have more than nine feet clearance.

The garage herewith presented would be half timber and stucco construction, and semi-fireproof. The frame is of wooden studding for the attachment of wire lath, and is intended to be finished with cement plaster within and without, entirely encasing the wood. The four-inch wooden studs are placed 16 inches on centres, with bridging between. When stapling the metal lath on the studding care should be taken to have the stapling sufficiently loose to allow a certain amount of play between the lath and the stud.

The footings are of concrete and the floor and base of cement. Splendid special details are given in the accompanying plate of the sill, jamb, windowhead, wire sheathing and roof.

The roof is of slate, which is laid on a board sheathing covered with a tarred or water proofed paper. Each slate laps the slate in the second course below three inches. The slates are fastened with copper or galvanized nails, one near each upper corner.

The pediment is constructed of half timber and stucco, admitting of some modest ornament in wood panels. There is excellent lighting provided for the garage, as two large windows are provided on the pit side, while on the other side there is one window and a private door. A double window panel in each door adds materially to the lighting facilities.

Two sliding doors are used, affording particular serviceability in view of the restricted frontage, and no obstruction to sidewalk passage if the structure is placed on the building line. The doors are hung from a standard overhead track and one door slides behind the other, so that either door may be opened, thus giving a direct passage to or from the pit side or the other side, as may be desired.

With its gable roof and attractive panels the front elevation of this garage is quite pleasing outwardly in architectural effect. The interior equipment is complete in every respect, which serviceability demands. It has a work bench and cabinet, water connection, sewer connection and a drained work pit. The cement floor is carried up four inches on all sides of the wall base.

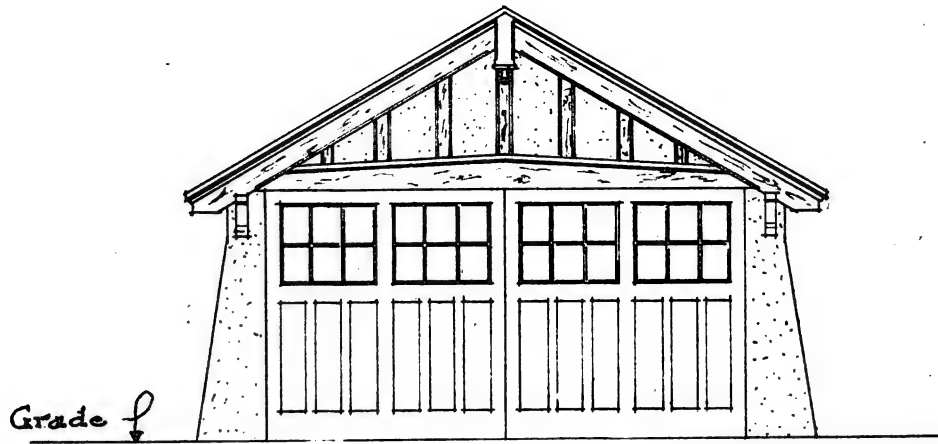
Figuring on the cubic contents, which is 3762 feet, on the basis of 18 cents per cubic foot, the cost would be \$677.16.

This garage is ideal for the owner driver or for the person who hires a chauffeur who is capable of making most of the repairs on the car, as it is not only amply lighted, but also has the necessary installations for equipment such as would be necessary in repair and maintenance work.

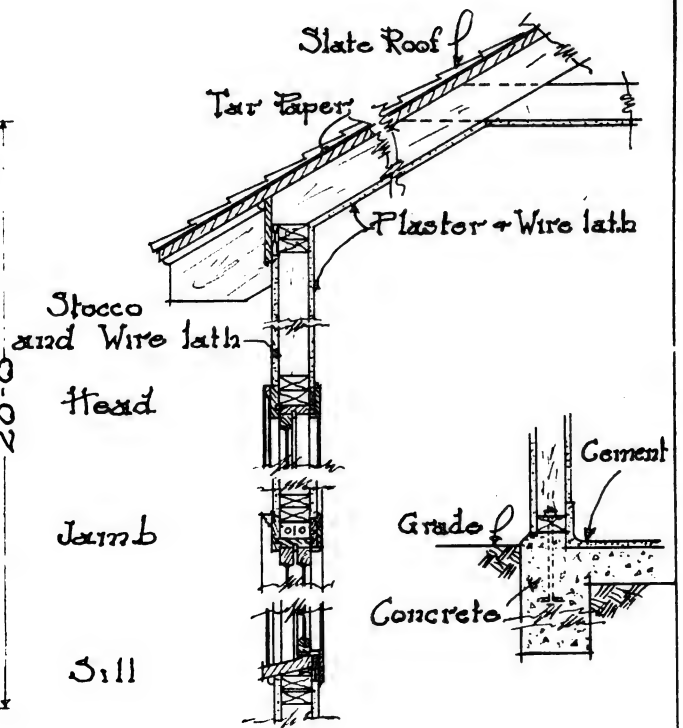
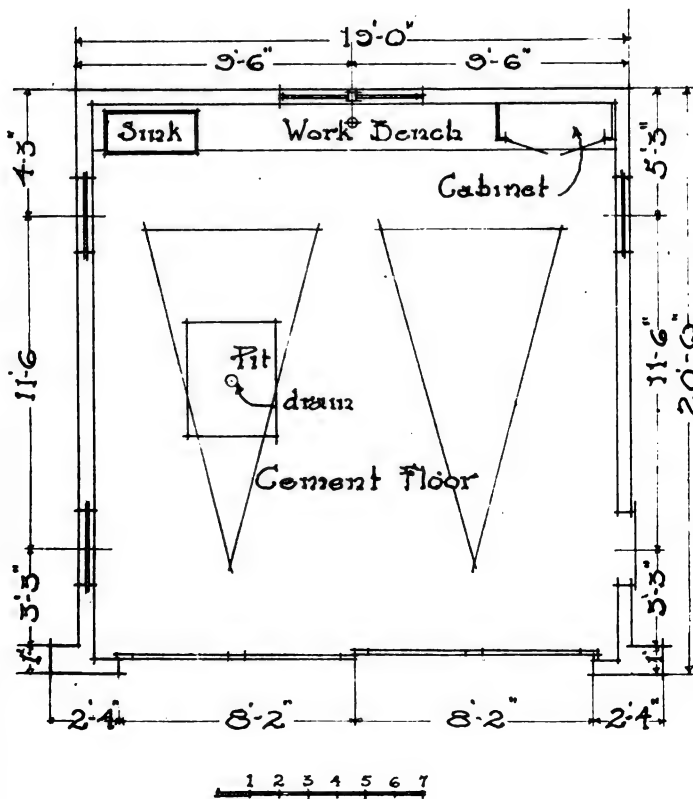
It is of the ornamental type, suitable for placing in a conspicuous place on a lot instead of at the rear of a residence or out of sight somewhere, as properly placed its possibilities of enhancing the value of the property would be much greater. Being of stucco and wood exterior, it is also possible to so decorate the finish and arrange tints as to harmonize with the finish of the residence.

In a garage of this type it is always the best policy to specify nothing but the highest grade of materials, as it makes for permanency in the investment and increases the saleability of the property upon which it is erected. Good construction materials call for less maintenance outlay, which is another fact that demonstrates the economy of good work and materials in a building for a high class residential property.

PLATE 2



Front . Elevation



3/4 Detail of Garage

What Milady Motorist Will Wear

By Mrs. A. Sherman Hitchcock.



MODEL AT THE LEFT—Trapshooting is a new development for the motorist and is entered into with enthusiasm. Appropriate clothing is being shown in the exclusive shops. The illustration shows coat and hat of gray rubberized silk, skirt of thorn tweed and stockings of gray. Courtesy of Abercrombie & Fitch, New York City.

MODEL IN CENTRE—One of the smart hats is of Shepherd plaid wool drawn in folds over a popular shape and faced with a band of dark material embroidered in a herringbone stitch. Courtesy Fashions Camera Co., New York City.

MODEL AT THE RIGHT—There is nothing like a suit of Pontine for motor wear in every sort of weather. Neither chill winds nor heavy fogs can penetrate through the waxed, leather-like surface of this material, which has an inner side

of silk or smooth cloth by way of lining, already attached. This model is shown by courtesy of Abercrombie & Fitch, New York City.

MODEL AT LEFT, OPPOSITE PAGE—Every motor woman is intensely interested in a smart frock to be worn beneath the coat. A particularly delectable model is here shown, tailored of crepe and satin. Courtesy Simon Costume and Dress Co., New York City.

MODEL AT RIGHT, OPPOSITE PAGE—This coat is one of the smartest models of the season. Fashioned of Jersey cloth this model exhibits all the earmarks of motor dressiness, having a wide collar, deep cuffs, tonneau pockets, large buttons and distinctive tie belt. Courtesy Franklin Simon & Co., New York City.

Chic Garments For Every Occasion of Motoring

TRAVELING in a motor car is distinctly enjoyable. To be tucked away in a cozy corner of a car when the spring comes with its bright sunshine, twittering birds and air that is soft and balmy, when the call of the country is strong and the motorist, leaving the city and dull care behind, goes forth through pine-scented breezes and over roads of macadamized perfection, then it is that the motoring woman enthusiast inspects her motoring wardrobe, for the bright days and the purr of the motor fan feminine interest into a blaze.

All enveloping motor coats, comfortable and attractive, are ready and the wide range of prices is really astonishing, for while the motor woman may pay a very considerable sum for a garment of the new suede cloth, which so closely resembles duvetyne, or one of the adorable heavy wool jersey coats, she can find very good looking and serviceable coats for \$15 and \$20. The material will, of course, be of inferior quality, but the garment will be smart and practical, copied

from an expensive model and excellent in line and detail.

The motor coat is to be seen in many fascinating models. For the woman who has not a car of her own and motors only occasionally, a coat of the general utility type is a better investment than a regulation motor coat. Almost every woman, even without a car of her own, is now possessed of clothing to go motoring should an invitation be forthcoming.

One substantial coat of heavy wool material should be provided, no matter how many of the charming creations in suedene, chanella cloth, or the ever popular mohair the motor woman may be possessed of. Such a coat should invariably be carried in the tonneau, even in the warmest weather; for, as soon as the sun drops below the horizon the thin frock may be covered with smart, warm coat, and one is well clothed for the ride home.

The new models are shorter, some reaching only to the knee. Deep shawl collars, panel fronts and turn-back cuffs are a feature of the new modes. The large collars may be

worn either closed or open with equal success. Very smart models are cut flaring from the line that seems to mark off a yoke. The front sections fold over each other and the only fastening is a belt which slips through two openings at each side of the straight hanging panel front. The tweeds are made on the lines of the English ulsters. A very safe model, because it really never goes out of style, is the conventional type of motor coat made precisely like that worn by men, and put into the arms eyes in the same manner, without the slightest fullness at the top, and fitting smoothly at the shoulder. Developed in Irish frieze, Scotch or English tweed or blanket cloth, a coat of this model is always smart.

The motor frock has now become a *sine qua non* of the feminine wardrobe. Fortunately, these frocks may be built without great expense. Serviceability and becomingness count for much in such frocks, and there are many details and designs which may be worked out at home. The chemise frock is one of the most popular models and some of these smart little frocks are so constructed that they slip on over the head. The simplicity and grace of these little frocks are their greatest charm and popular materials are wool jersey, suedene, serge, mohair, satin and chenille sylvette. Taffeta still holds its own and will be used considerably for motor frocks.

In motor headgear the problem is easily solved if one goes at it in the right way. Firstly, a motor hat is not a motor bonnet—the latter went out of date some time ago and is now decidedly *passee*. A smart hat of small proportions and with but little trimming, either of the turban or toque persuasion, is very practical. The veil is a matter wholly decided upon by personal taste and distance. For driving about town or for short trips any one of the smart new open-meshed veilings are really all the protection needed, but if it is a long ride or one is touring, then a long veil of chiffon cloth or crepe de chine is not only a protection from the dust, but also a means of keeping one's hat just where it should be. It is true, however, that very many experienced motorists prefer nowadays to wear the open-meshed veils even on long drives.

A very chic motor turban has a rounded crown of mustard colored wool with an upstanding brim of soft brown silk jersey, which is fashioned on each side into long tabs which button doubly under the chin. A pretty motor model is a very small mushroom hat of vivid red straw with mustard cord laced about the edge of the brim. A model which is a trifle more dressy is of three-cornered effect in Copenhagen blue edged with a tawny yellow gros grain ribbon. Where the wing like crown and brim meet there is a narrow band of gros grain ribbon, which ties in a flat tailored bow at the front. Over this hat is thrown one of the new French veils, which is brown, with a large open mesh. The charm of this veil lies in the fact that it is embroidered with fine white dots. Goggles may be worn with any of these small hats without detracting from the general attractiveness of the arrangement.

Motor bags are of satin and taffeta, and are about 14 inches wide and quite as long. They form three pockets and are suspended by ribbon. A goodly quantity of small belongings can be stowed away in them. A motor purse is made of blue glazed leather, lined with *moire* silk, and has a very

unpretentious gold clasp. It is simple enough and quite demure outwardly, but its interior contains unusual treasures for so unsuspecting an exterior. Beside the usual compartments for change, bills and visiting cards, there is fitted neatly under a blue leather strap a small mirror. In the compartment next to this is a little cut glass and silver mounted vinaigrette, and in the corresponding compartment a powder box with a little puff. In the other side it contains a pair of goggles, mounted in chased silver, and last is a little tablet and pencil and box for postage stamps. Vachette is a favorite leather for motor bags, and the shapes are large and rather flat, so that the bag may be slipped between its owner and the side or back of the tonneau.

Motor cushions covered with thin leather of any and every color and made in different sizes are shown in large assortments, as are air cushions, big and little, covered with gorgeously colored silks. Some of the smart cars have four pillows covered with silk in the same color as the upholstery.

Leather route books and cases are included among the small conveniences which appeal to women doing touring. The case looks like a flat wrist bag without a fastening and has two handles. Under the outside flap, on either side, is a pocket for note book, memoranda and pencils, while inside is the receptacle for the route book.

Something which every woman appreciates is a case of smelling salts. The regulation bottle of salts every motorist is familiar with almost always spills in the motor bag, ruining the lining of the bag, as well as losing the salts. The new cases come in red, green, blue and brown morocco, and enclose the bottle so snugly that the stopper cannot work itself loose by the bag's being overturned. Among the latest ideas are the hand stitched leather cases containing the curling iron set. An alcohol can, the burner and curling iron, all in nickel plate with ivory handles, are enclosed, and make a complete parcel to stow away in the week-end bag. Another little convenience is a leather bag containing four boxes with glass stoppers, a porcelain jar and a small pasteboard box. This is especially intended for the carrying of medicines that

might be required while away from home. Cologne bottles are shown with wicker covers and nickel plated tops, for motor traveling. In this style the contents are perfectly safe and they are smart looking little affairs.

There is, to those versed in motoring lore, a vast difference between the general utility coat and occasional motoring garment, and the bona fide article. The true motor coat is much roomier in proportions than is the coat designed for use on the street, and there is also a sportsmanlike air and jauntiness to the smartly built garment, which proclaims its use in each knowing line and button, whether the material be of expensive Bolivia, a sturdy tweed, or the lighter mohair. The woman who is not a novice at motoring knows that one may be sufficiently cold on a mid-August night to need the comfort of a warm wool coat. The warmest of wool wraps are comfortable on a cool summer night, riding through one of the heavy, penetrating mists.

Little by little the designers of motor raiment have achieved the union of motor comfort and motor beauty. There is something attractive and practical provided for every woman if she will but take the time to hunt until she finds it.



Action of the Bendix Drive

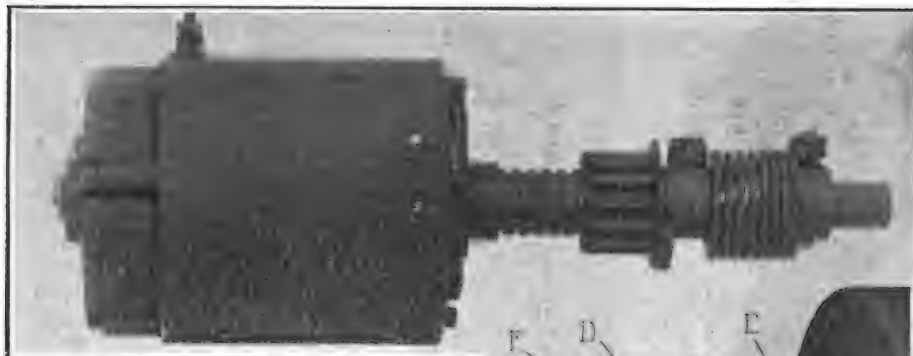
Popular Electric Motor Starter Has Automatic Device Working on an Interesting Principle

AT THE present time very few cars are manufactured or sold without some form of starting arrangement. The electric motor starter is being adopted very generally for the reason that as some form of electrical apparatus is necessary for lighting and ignition, it is a simple matter to utilize the current generated and stored in a battery for starting the engine.

If an electric motor is used for starting it is best that it be used only for that purpose, and when not in use entirely disconnected from the engine. Thus the wear which might be caused by constant rotation is minimized. Many forms of clutches and engaging mechanisms have

been and are used, among which one of the popular forms is the Bendix drive. As this gear is not balanced a certain inertia or resistance to turning is offered and it does not turn with the screw E. This being the case it is carried along the screw. By this action it is meshed with the engine flywheel at about the same time that the end of the thread is reached.

When the gear is carried to the end of the thread and against the shoulder, the general tendency is to rotate with the screw. Now if this thread were to be attached directly to the motor shaft the result would probably be a stripped gear or a burned out motor. But by the action of this mechanism the shock is ab-



been and are used, among which one of the popular forms is the Bendix drive.

To be practical a clutch on the engine starter should be both automatic and simple, it must be positive and yet have smooth engagement so as not to bring too great a strain upon the parts involved. The Bendix drive is entirely automatic and by its use two things are accomplished. First, when the starting current is turned on, causing the motor shaft to revolve, the power is transmitted through the Bendix drive to the engine crankshaft; second, as the engine begins to run on its own power, and the current is stopped from the motor, the motor is automatically disconnected from the engine by the action of the drive.

In the illustration are shown two views of this drive. The first as it appears on the motor, the second, a cross sectional view, showing the essential working parts.

Upon reference to the latter view it is seen that the shaft B, which is driven by the electric motor, when the current is turned on, is connected with the collar A, through the heavy spring F to the collar D, to which is fastened the threaded sleeve E, and upon which is carried the gear C.

Assuming that current has been turned on in the motor, as soon as the shaft B revolves the screw E begins to turn in the same direction. It will be noted that the gear C is counterweighted, that is, a small weight is attached to the cir-

cumference, throwing it slightly off balance. As the engine speed increases and "runs ahead" of the motor the gear speed exceeds that of the motor and the gear is forced to travel back upon the screw E until it is carried out of mesh. As the current has been cut off in the meantime, the motor shaft gradually comes to rest with the gear in its original position, not in contact with the engine.

AUTOMOBILE CLUB OF AMERICA MEETING.

The annual meeting of the Automobile Club of America was marked by the patriotic demonstrations of the speakers and members and the adoption of resolutions supporting the course of the government and in favor of compulsory military service.

President A. J. Hemphill, Colgate Hoyt, Hamilton Kean and W. W. Miller and Henry B. Anderson, formerly president of the club, were the speakers. Governors of the club for the term expiring

in 1920 were elected as follows: H. E. Gary, William K. Vanderbilt, Jr., Oliver G. Jennings, Franklin Q. Brown, James A. Blair, Dave H. Morris and William W. Miller.

The following governors hold over: Percy A. Rockefeller, Alexander J. Hemphill, James A. Stillman, Frederick D. Underwood, Henry B. Anderson, Hamilton F. Kean, Horace E. Andrews, James C. Brady, Henry Evans, Colgate Hoyt, Dudley Olcott, 2nd., Henry Sanderson, Edward Shearson and Henry R. Taylor.

URGE STANDARDIZATION OF BATTERY IGNITION.

H. E. Rice, sales manager of the Atwater Kent Mfg. Co., in the course of an address at the monthly meeting of the Philadelphia Section, Society of Automotive Engineers, strongly urged the necessity of standardizing parts used in connection with battery ignition systems. He pointed out that both the manufacturers of and users of ignition systems would be benefited by the adoption of one or two standard ignition mountings in place of the various types at present in use.

In speaking of the importance of the matter, he declared that out of 108 automobile makers, 86 are today using battery ignition systems, as compared with 22 makers that are using magneto systems.

WELSH TRAFFIC BILL PASSED IN NEW YORK.

The New York state Legislature has passed the Welsh bill providing for uniform traffic regulations throughout that state in its amended form, which excludes the city of New York. The bill provides for a system of signals to indicate the movement of all vehicles and limits their speed to a rate which will not endanger others on the roads.

HARRY S. HARKNESS TAKES OVER SHEEPSHEAD SPEEDWAY.

Harry S. Harkness, the well known sportsman and promoter of automobile speedway races, secured the Sheepshead Bay Speedway on May 2 when the property was put up at auction to satisfy a mortgage of \$2,135,161.86, which was held by himself. His bid of \$1,300,000 secured both the land and improvements thereon.

It is understood that he will manage the Speedway himself and will continue to back a racing team on the Speedway circuit.

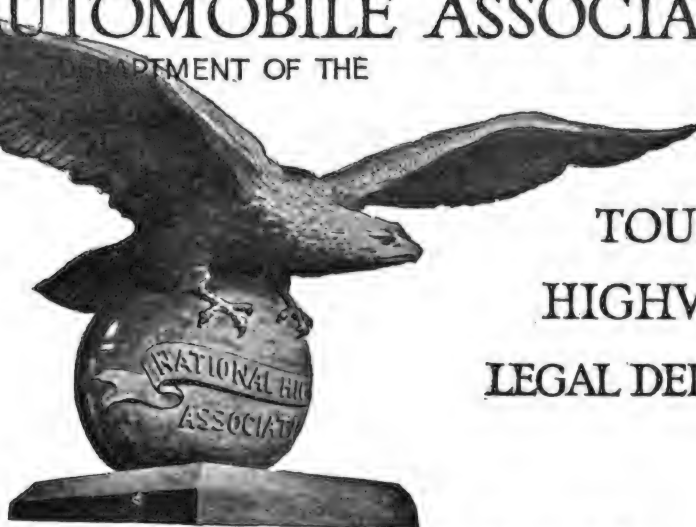
BIG MARKET FOR CARS IN CANADA.

Reports from Canada indicate that the demand from that country for American made cars will even exceed last year's sales, which totaled 28,000. Manitoba, Saskatchewan and Alberta provinces alone invested \$45,000,000 in automobiles from the United States last year and spent \$7,500,000 additional for tires and accessories.

OFFICIAL JOURNAL OF THE NATIONAL AUTOMOBILE ASSOCIATION

NATIONAL
HIGHWAYS
ASSOCIATION

TOURING
HIGHWAY
LEGAL DEPTS.



9 PARK STREET, BOSTON, MASSACHUSETTS

Bearing the Flag Through America in May

Motorists Will Find Several Cities Which Have Special Traffic Regulations—Police Activities as Reported from Various Centers

Carry the United States FLAG

WE REQUEST that all motorists carry upon their automobiles at least one American flag during these times when it is not only our duty, but ought to be the joy of every citizen to manifest in some degree his patriotic spirit.

I NTEREST of members of the National Automobile Association turns at this time naturally to traffic conditions, rules, regulations and police activities in the various communities where they may be going on tour. Information on these lines has therefore been assembled in this issue of this journal.

CITY TRAFFIC LAWS AND REGULATIONS.

Members and motorists generally should bear in mind that many of the American cities have adopted local traffic regulations and rules and that drivers are as amenable to the city traffic rules as to state laws and should govern themselves accordingly. We have not yet received the traffic rules of all the cities which have enacted them, but for the present we wish to call the attention of our members to the fact that the follow-

ing named cities have adopted them and that due regard must be shown for them while touring through these centres:

New York City.	Bennington, Vt.
Albany, N. Y.	Boston, Mass.
Buffalo, N. Y.	Worcester, Mass.
Rochester, N. Y.	Springfield, Mass.
Philadelphia, Penn.	Fitchburg, Mass.
Erle, Penn.	New Bedford, Mass.
Washington, D. C.	Arlington, Mass.
Atlantic City, N. J.	Pittsfield, Mass.
Trenton, N. J.	Manchester, N. H.
Baltimore, Md.	Portsmouth, N. H.
Wilmington, Del.	Hartford, Conn.
Newport, R. I.	Willimantic, Conn.
Westerly, R. I.	New London, Conn.
Cleveland, O.	Waterbury, Conn.
Brattleboro, Vt.	Bridgeport, Conn.

And all New Jersey cities are under special state wide traffic regulations.

Police Activities

BOSTON, MASS.

Care in Driving Through the Streets.

Traps have been established in many streets and are being worked some periodically and some constantly. Moreover the police of the city are beginning their "spring drive" against every imaginable phase or violation of the motor vehicle laws and traffic rules.

Some Don'ts in Boston.

The head of the Boston police, in view of the fact that more than 60 cars were reported lost during the month of April; seven thefts for one day alone being reported, suggested the few following "Don'ts."

"Don't leave your automobile unattended for a long period. Remember, in no part of the city, downtown or in the suburbs, can one leave a car unattended for over 20 minutes. If you do you are violating a city ordinance and liable to prosecution.

"Don't leave valuables in your car. They are easily stolen.

"Don't leave your car unattended when you are at dinner downtown, or at home, or at the theatre. If you do, you take a chance of being forced to go home either in a public conveyance or on foot.

"Don't fail to get some sort of a lock or contrivance that will make it impossible, or almost so, for thieves to take your car. While the lock may not stop the thieves from attempting to get away with the car, there is just enough trouble and enough danger of detection for them to seek other prey."

WORCESTER, MASS.

Hereafter persons arrested in this city for operating automobiles under the influence of liquor, or in unregistered automobiles, or without a license, will not be allowed to drive their cars even to the station house after their arrest. It has been the practise to allow the operator to continue his driving to the police station with a patrolman sitting beside him, but it has now been decided by the authorities that a man who is not fit to operate an automobile on account of being intoxicated should not be allowed to drive it after being detected. Henceforth operators arrested for any of the

foregoing offenses in the city of Worcester will be taken to the police station in the usual manner and the police will take care of the car.

SPRINGFIELD, MASS.

The police of this city are determined to stop fast motor driving through the streets, not only of jitney cars, but of all other motor vehicles, and it would be well to exercise due regard for motor vehicle laws and traffic rules of this city while traveling through it.

CONCORD, MASS.

While driving through this town do not fail to pass to the right of the semaphores, which have been placed in the central part of the town.

NEWTON, MASS.

The police of this city are arresting and prosecuting overspeeding motorists.

WESTBORO, MASS.

The state law of 15 miles an hour will henceforth be strictly enforced on all main streets in this town. Large signs indicating this fact will be erected on every road approaching the town.

BLACKSTONE, MASS.

Police of this town have been ordered to stop, arrest and prosecute all operators of motor vehicles traveling at a dangerous or careless rate of speed.

SOUTHBRIDGE, MASS.

Owing to numerous complaints against fast driving of automobiles upon Hamilton street, in this town, and at different points from Globe Village Centre, also at Wheeler's corner and the six streets intersecting with Main street, near Wheeler's corner, the police of this town are planning to stop these speedsters and to hale them into court. We suggest, therefore, a compliance with the law while traveling through Southbridge.

SYRACUSE, N. Y.

In the near future the police of this city will begin a rigid enforcement of the new traffic regulations recently adopted for the regulation of vehicular and pedestrian traffic. To insure greater safety to the general public a new type of semaphore, new traffic uniforms, new arm signals, mounted officers and other devices and ideas may be resorted to.

UTICA, N. Y.

The commissioner of public safety of this city has issued orders for a strict compliance of the law and spirit of the local traffic ordinances during the coming motor season. Motorists traveling in a manner likely to endanger the safety of the public or in traveling in a careless manner will be prosecuted and haled into court. It is planned to erect semaphores at important intersections of streets throughout the city for the guidance of motorists.

BUFFALO, N. Y.

Important amendments are proposed to the present traffic regulations in this city and at an early day will doubtless be adopted. They are as follows:

That no cars be parked on Main, Washington or Pearl streets between Chippewa and Exchange streets, or on any intersecting streets without a permit from the police.

That no siren whistles be allowed ex-

cept on police and fire apparatus and that gongs be used only on police and fire cars, by the sheriff, authorized public service utilities and ambulances going on calls.

That white coats and boots be worn by traffic policemen in rainy weather and lighter weight uniforms in summer than they wear now.

That small runabouts be bought for

the police to regulate the traffic.

ROCHESTER, N. Y.

Motorists driving in this city must not violate the traffic rules in passing a stationary street car closer than six feet. The department of public safety is putting in an active campaign against these dangerous violations.

How Quickly Can You Stop?

In order to avoid accidents at grade crossings and other places it might be well for the motorist to keep in mind the actual distance that is required in which to stop his car, with good brakes, under proper conditions and on reasonably good roads should an emergency arise. Statistics have been compiled by the railroads showing that the average driver of a motor car is careless, in many instances, in passing over railroad crossings.

The Southern Pacific has made a special study of this matter and the results of the observation of 20,000 motor cars shows that 69½ per cent. of the drivers cross the railroad tracks without looking to the right or to the left, and that 525 drivers crashed into the gates when they were down and bell ringing. Only 2.7 per cent. of the drivers looked both ways and 27.8 per cent. looked one way. Some 3301 drivers, or 19.3 per cent. passed over the tracks at a reckless speed, and only 35 drivers stopped their machines before crossing.

In order to demonstrate the carelessness of motor car drivers and also to show that they have in their power to prevent accidents in many cases, an experiment was recently made in stopping a car and a train. A Dort automobile was used in the tests with interesting

results. Practically the same results, however, could be attained by any first class car. The train consisted of a big Southern Pacific engine, with eight passenger coaches, the whole weighing 750,000 pounds. At 40 miles an hour the train was stopped in 900 feet. The automobile at the same speed was stopped in 22 feet. At 25 miles an hour the train was stopped in 500 feet and the automobile in 12 feet. While at 15 miles an hour the train moved 300 feet before it was stopped, while the automobile came to a stand still in four feet.

DELIVERY DATE MUST BE OBSERVED.

A recent case before the Superior Court at Suffolk county, in Massachusetts, was determined, which cannot be but of interest to almost every buyer of a motor car. A dealer some time ago sold a new car, agreeing to take a used car in part payment. The delivery of the new car was to be made at about a date specified in the agreement and the dealer, as is often the case, made a sale of the used car taken in trade. This car to be delivered also at about the same date as the new car. The new car, however, did not arrive on time. Consequently the used car was not turned in when expected. The buyer of the used car demanded it and the dealer, unable to deliver it, paid back the deposit that had been made. The customer for the used car brought suit, asserting that he offered the balance of the price of the car and that the car was not forthcoming. As a result of the trial the customer recovered more than two-thirds of the amount he had agreed to pay for the car.

PLYMOUTH MEMORIAL HIGHWAY.

A proposition which is attracting considerable attention before the Massachusetts Legislature at the present time is that for a Memorial Pilgrim Highway plan to connect Boston with Plymouth.

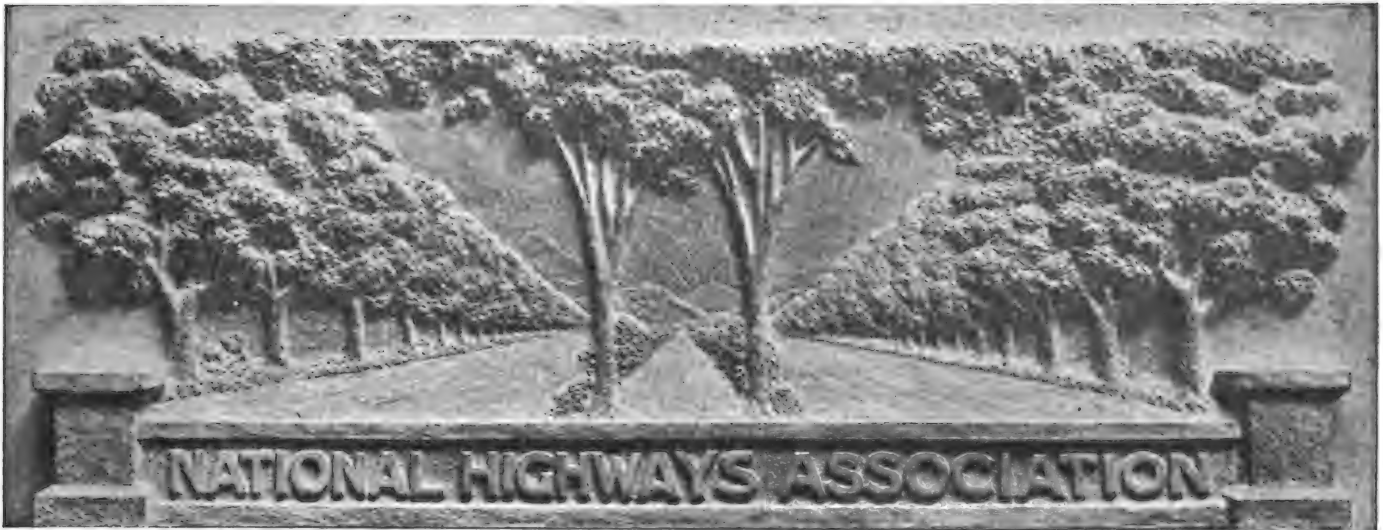
The scheme is to continue the Old Colony boulevard, which is about 100 feet wide, across the Neponset river to the Quincy Shore boulevard; thence through Hancock street and Wollaston avenue, through Merrymount Park, across the Metropolitan Shore boulevard at the end of Black's Creek; thence along the westerly edge to Mount Wollaston cemetery, through meadow lands and the old canal at the saw mill, along the westerly shore of Town river, coming back to the present location of Washington street, near the present Fore River bridge. From this point it is proposed to connect this highway with Quincy avenue, through to Plymouth.

Proffer of Club Courtesies

We are pleased to announce that our members will be welcomed by the Automobile Club of Philadelphia, 23 South 23rd street, Philadelphia, Penn.; the Automobile Club of Maryland, S. E. corner Mount Royal avenue and Cathedral street, Baltimore, Md., and the Automobile Club of Canada, Montreal.

At the Philadelphia club members may store their cars in the club's garage. The club also has for sale, at a low price, maps and route books for Pennsylvania, New Jersey, Maryland and contiguous states.

We are advised by the New Brunswick Automobile Association, with headquarters at St. John, that a great improvement in the highways of that province are in contemplation, so that it is expected in the near future New Brunswick will be a very attractive resort for motorists.



Attainment of Good Roads by the Federal Plan

What It will Mean to the Rural Districts at No Cost to the Nation Except Using Its Credit for the First Few Years

By GEN. COLEMAN DU PONT.

Chairman Board of National Councillors of the National Highways Association.

THROUGHOUT the history of the world inter-communication between its peoples has been of fundamental importance to their highest development. Those nations who have had the best developed means of communication within their own borders and with the outside world, have always excelled in military power, wealth, learning, art and civilization. The ancient Greeks set out in ships and brought home learning and art, as well as vast wealth, from the shores of Africa and Egypt. The Romans built their vast network of roads that there might be free and easy communication for their people between the most distant parts of their mighty empire.

It is intercourse, social, educational and commercial, which makes possible the most rapid progress of civilization and the greatest human happiness.

If this is true of the whole world, how much more true does it become of our great and comparatively thinly populated country, where the average density of population is only 31 persons to the square mile—where if we were all spaced evenly, each man, woman and child would have 900,000 square feet of ground to himself and would be obliged to travel nearly a quarter of a mile to visit his nearest solitary neighbor.

Or to figure in another and more practical way. There are in this country 6,500,000 farms averaging in size 138 acres and in value \$6500. Employing the same reasoning as above, every farmer must needs travel an average distance (by the most direct route) of a half a mile to visit his nearest neighbor.

Of all the various modes of inter-communication—water, roads, railroads, mail, telegraph, telephone and wireless—only one, roads, are free to all the people of the earth. Roads are by far the most universally used and are therefore the most beneficial to the greatest number of people. They are of indispensable value to the rural districts. Good roads everywhere are likewise of indispensable value.

The commercial phase of the question, while if not of more importance than the social, can probably be rendered more convincing by statistics.

It is estimated that more than five billion (5,000,000,000) tons of freight per annum pass over all the highways of this country with an average haul of a little under ten (10) miles. The average cost is about twenty-three cents (23c) per ton mile; while on good roads this cost would not exceed eight cents (8c) per ton mile. In other words, at least one dollar and a half (\$1.50) could and should be saved on every ton moved on our highways. This means \$7,500,000,000. Thus the total saving from good roads is almost beyond comprehension.

Seven and one-half billions of dollars per annum! This would build fifteen (15) Panama Canals a year, fifteen hundred (1500) dreadnaughts a year; it would build all of the 250,000 miles of railroads in the United States in a period of three (3) years. It represents one-quarter ($\frac{1}{4}$) of the entire annual wealth produced by this great nation and the full amount would be repaid in a very few years.

Staggering Farm Increment.

Look at another phase of the situa-

tion: The total value of farm real estate and buildings in this country is over \$40,000,000,000. If only our present two million (2,000,000) miles of highways were to be improved these land values would be increased at least one-quarter ($\frac{1}{4}$) over their present value, or an increase of \$1500 per farm. With our total of 6,500,000 farms this gives the staggering sum of \$10,000,000,000—ten times the entire annual expenses of government of this great nation.

Still another view: Assume there are only 1,000,000 automobiles in the United States. Estimating that each one of these makes an average of twenty-five (25) miles a day, we get a mileage of over 7,500,000,000 per annum. If the operating expenses average fifteen cents (15c) per mile the total annual expenses exceed \$1,000,000,000. A goodly sum. Are not bad roads responsible for ten (10) per cent. of this? We think more, much more. This means a possible annual saving of not less than \$300,000,000.

There are 27,000,000 horses, mules and other draft animals, more than 4,000,000 horse drawn vehicles, 2,000,000 bicycles and 100,000 motorcycles in the United States. These, with the automobiles, are valued at more than \$5,000,000,000. If from good roads only ten (10) per cent. in depreciation per annum were saved it would amount to the enormous sum of \$500,000,000 every year.

Does this indicate that we cannot afford to build good roads? If we were to put a tax on only a few articles of personal property, which should not be done, making it equal to this present, useless, extravagant and wasteful depre-

ciation, we should be able in a period of less than 20 years to give our great country a complete and unified network of excellent roads binding together North and South and East and West in a closer and firmer brotherhood.

Such facts and figures can be multiplied indefinitely to show the conditions dependent in whole or in a large measure upon the bad road conditions, such as undeveloped farms, poor schools in rural districts, high cost of products, migration from farm to city and countless other modern social and economic ills. They are self evident and need no further proof.

Income Would Repay Cost.

In comparison with the foregoing figures the cost of roads seems insignificant and when you consider that if highways, national and state, are built under the following plan the cost will not only soon be repaid, but that the legitimate income will repay the cost of road and will in a few years bring in an income to the nation or state that will be greater than its tariff has ever been and that in a very few years later the income will be sufficient to take off many, if not all, of the taxes of today, and this income will be constantly on the increase, so that in many states it will equal the entire amount of taxes within less than a century, this plan should be most carefully studied. The more carefully it is studied the more certain will be its adoption.

The one important feature of this plan is when the National Highway Commission or whoever is at the head of and in charge of locating national highways first decides on the location of the road to be built from one place to another (either by acquiring present road or building new ones) that they acquire a strip of land on each side of whatever width is decided upon.

The nation would then let any person, firm, corporation, society or organization have as much of the adjoining land, say 100 feet, and for as long a time as said firm or other party paid to the nation three, four or five per cent., as may be decided, on the value of the land exclusive of improvements, this value to be readjusted at stated intervals. The width held for road purposes should be at least fifty (50) feet. Until needed part of this could be leased.

Whoever leased the land would be just as safe and as well protected (so long as they paid the tax on it) as if they owned the land themselves, and paid the tax on it. The nation would only get the rental on the land made valuable by the road built by the nation on part of the land they acquired by purchase and are entitled as lessee to the increased value as citizens today are entitled to and get the benefit of constantly increasing value of land adjoining good roads.

The problem is before us. How shall we attack it? What is the quickest and most effective remedy for the bad road conditions of the United States today and at the same time the smallest possible outlay by the nation consistent with good work?

Let us turn to the history of highways in this country. In the early days road

building was largely confined to the efforts of local communities—the villages, towns and cities. The town road official, in most cases with no knowledge of road building, directed these improvements, sought the appropriation therefor and controlled the work and extravagant expenditures. This caused the growth of a disjointed system of roads. One town spent more money and built better roads than the adjoining town. Thus jealousies were aroused between the local communities until finally a larger unit, the county, took over the more important routes and built roads of various types of construction, connecting the various portions of the county in a little more comprehensive and efficient manner. But soon the same difficulties developed upon a larger scale. No attention was paid to intercounty highways and consequently roads developed which did not properly connect the various parts of the state—hence the creation of state highway commissions and state highways. There were also other reasons for this. Larger appropriations could be obtained from the state. Uniformity of construction and maintenance could be secured. Accentuation in town and county road improvement was not the least of the beneficial results obtained.

But now we are confronted with still larger problems—the development of good roads over all and connecting all parts of the United States. Should we not apply the lessons learned by the experience of the past? Can effective interstate highways be obtained efficiently, speedily and economically through the disjointed efforts of the several states, each working separately and exclusively for its own selfish ends? And can federal "aid" to these separate states pro-

duce anything but chaos—costly roads, roads beginning nowhere, ending nowhere—and at the cost of millions of dollars annually upon which there will be no return but a constant expense to the nation. No! What we need is national highways, highways beginning somewhere; ending somewhere. Highways constructed according to some definite plan and along logical lines throughout the whole United States. Highways backed by the people of the whole nation, co-operating and working together for the greatest benefit to all and built so that they would be a source of revenue and not expense. It is not a local problem. It is a national problem and can only be met by the whole nation working together intelligently as a unit.

Point to National Highways.

National highways built, owned, maintained and controlled by the federal government under the direction of a National Highway Commission that will pay for themselves and ultimately be a source of income, constitute the one and only logical plan so far suggested, to bring about a unified and effective system of highways throughout the entire country. But next in importance to a strong national sentiment to push ahead the cause of national highways and good roads everywhere is some comprehensive plan of action. Public spirit is awakening to our overwhelming lack of good road facilities and their attendant evils. But public sentiment is slow, uncertain in its movement if not guided and led by a definite and logical aim. We need to crystalize sentiment. We need action! Each year means billions of dollars wasted. We need a well defined plan to follow and public sentiment will push it along.

Connecticut Highways Detours

We have been informed by the State Highway Department, Connecticut, that construction work upon a number of state highways has been begun, or will shortly be begun, which will necessitate detours. We call the following to the attention of our readers:

BRANFORD.

Bridge over river to the Post Road. Detour.

BOLTON.

Elimination of grade crossing at Bolton Notch. The old road may, at the present time, be used, but travelers should observe considerable caution in so doing.

DERBY TURNPIKE.

Clark's corner to the Derby town line. Detour.

HARTFORD TURNPIKE.

From Meriden town line to Berlin Centre. Detour.

MANVILLE.

New London turnpike is under construction, but as the road will be open for traveling during construction no detour will be provided, or will one be necessary.

MIDDLETOWN.

Middletown-New Haven turnpike. South Main street and Durham is under construction and detour through Warwick street, through Pamecha avenue, back to the turnpike.

MILFORD.

From Perry street to the Housatonic river. Detour.

NAUGATUCK.

North Main street is closed from Maple

street to Bridge street.

In going south detour through Bridge street, Church street to Maple street. Going north detour through Maple street, Church street and Bridge street.

PUTNAM.

Children's Home road is under repair, but no detour is necessary.

STAMFORD.

Long Ridge road, from the New York state line, running southerly towards Stamford for about five miles is under repair. North bound travelers from Stamford are directed over High Ridge road.

TORRINGTON.

The Torrington-Winsted road is in poor condition at Crittendon Hill. This is a grade road and in an incomplete condition. While the surface is rough for traveling it is not dangerous and the general public are using this road.

WESTPORT.

The bridge crossing the Saugatuck river is under repair. Detour plainly marked.

WINDSOR.

At the "Death Trap" at Windsor there is a short detour plainly posted.

DRIVING PAST SCHOOL HOUSES.

School children, in most instances, are apt to be easily excited or confused, and we suggest to our members and to motorists generally that they exercise special care and consideration for school children when passing school houses anywhere in the country.

**FLAG HOLDER.**

(Figure 361.)

"Be patriotic and show your colors on your automobile," is the general slogan of all Americans today. Anyone can make a flag holder for attaching a flag to the filler cap of the radiator at a very small cost. Get two short pieces of strap iron about $\frac{3}{4}$ by $\frac{1}{2}$ inch and bend them in the shape shown in the illustration. Drill a $\frac{1}{4}$ inch hole through them and insert a bolt. Remove the radiator filler cap, place the large bend over the filler and with the bolt in position clamp the flag and fitting into place as shown at B.

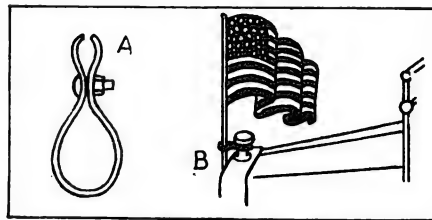


Fig. 361—Flag Holder.

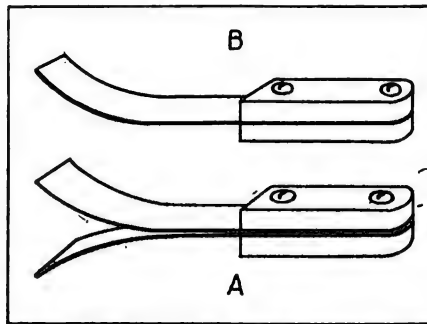


Fig. 362—Carbon Scrapers.

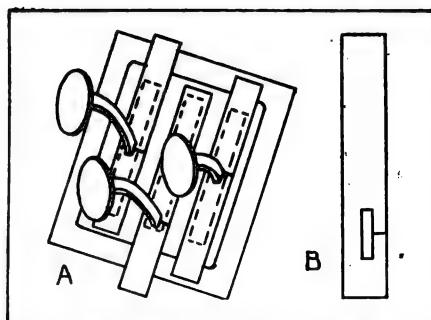


Fig. 363—Ford Comforts.

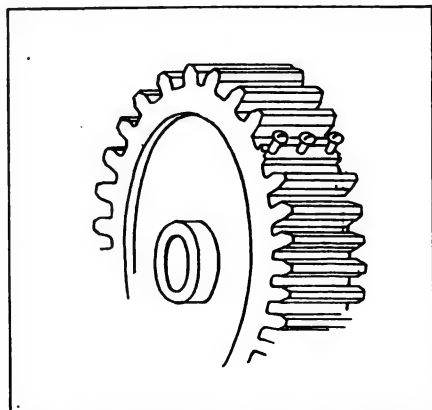


Fig. 364—Temporary Gear Repair.

Get three lengths of steel clock spring, preferably about $\frac{3}{8}$ inch wide and 10 inches long, and, after removing the temper from about four inches of the end, bore two holes through them and mount in handle as shown in the illustration. The holes will allow the handle screws to pass through the spring, holding it firmly in place. The free ends of the springs should be ground rounding. If two springs are mounted as shown at A the inside top of the cylinder and the piston may be scraped at the same time. Turn the engine crank over until the piston in the cylinder upon which the work is to be done is at the top of its stroke, insert the scraper A and move back, forth and around inside until some of the carbon is dislodged. Remove this loose carbon by inserting a tire pump tube through the spark plug hole and blowing, then repeat the operation with the scraper. With a little care most of the carbon will be removed by this process and the power of the engine greatly augmented.

FORD COMFORTS.

(Figure 363.)

Many and diverse are the accessories and comfort extending products for the Ford car. Now that warm weather is near the question of keeping the feet cool comes up. Through the slots in which are placed the control pedals there is a constant draught of hot air from the engine, carrying with it heat, dust and oil. A suggestion for the elimination of this nuisance is given in the illustration herewith. A flat piece of tin slightly longer than the slot is cut and fitted to each pedal in such a manner as to cover the slot. As the pedal is pushed forward the tin slides upon the foot board and does not interfere with the action, yet excludes a greater part of the circulation of air from under the hood into the car. If the pieces of tin are cut as shown at B they may be applied to the pedal without rivets or screws simply by bending back the lips at each side of the slot, slipping over the pedal and straightening the lips to the original position.

FIXING THE SPARK.

There is more science in the proper handling of the spark control lever than in the handling of the throttle, for the

CARBON SCRAPERS.

(Figure 362.)

The demon "carbon trouble" causes, perhaps, more trouble and loss of engine power than any other engine fault. Although many people believe that in order to dislodge carbon from the engine a removal of the pistons or engine head is necessary, the ejection of the demon may be accomplished simply through the hole left upon the removal of the spark plug.

power, speed and gasoline consumption is to a great extent dependent upon the proper advance or retardation of the spark. Few drivers care to manipulate this lever more than is necessary, depending upon the throttle for both power and speed, when if the spark were properly managed there would be no need for throttle change. It will pay one to spend a little time on a few experiments to determine the best spark setting for idling, power and speed on the lever, and when the different points are found, marking them. Select a hill for the experiment and with the throttle kept in one position run the car up the grade with the spark lever set at different positions a number of times until the hill is negotiated with the least engine effort. Then mark this point by screwing a small piece of tin in the shape of an arrow to the quadrant. In a similar manner find the best adjustment for low speed on a slight grade and mark it. In this way the spark may be set instantly at any time with satisfactory results.

THIEF WARNING.

(Figure 365.)

There is an old saying that "Honesty is the best policy," another to the effect that there is honor even among thieves. It seems as though both of these time worn adages have been placed on the out of order list, as the number of automobile thefts are constantly growing. How to foil the auto thief is a big problem that is attracting much attention at this time. A novel device is used by one of our subscribers that certainly will cause the would-be thief considerable alarm and a big surprise if he should make an attempt to take the car away. At point where the wires to the electric horn on the Ford car pass through the dash board two very fine silk covered copper wires are soldered and insulated in such a manner that the splice is entirely concealed inside the wood dash. The fine wires are lead along the dash, beneath the floor boards to the board beneath the seat. These wires are not tacked to the boards at any point, but glued with rubber cement and then painted with black paint and when in place are very inconspicuous. The two ends are connected with a novel switch arrangement, as shown in the illustration. The head of the screw sticks through the seat board about 1/16 inch. When the driver leaves the car he gives a turn on the screw, which makes the contact as shown at A. When the unsuspecting thief cranks the engine he is greeted by a prolonged blast from the horn, which will continue as long as the engine is running or until the screw is turned back so as to break the connection as shown at B.

TIMER INSULATION.

(Figure 368.)

A large percentage of electrical troubles on the automobile are caused by the breaking down of insulation by oil or water and consequent short circuiting of the current. This trouble frequently is

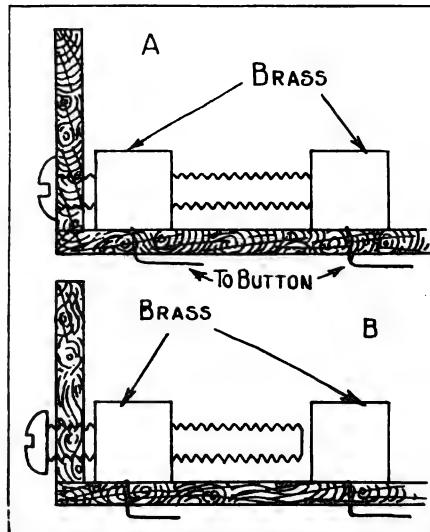


Fig. 365—Switch Arrangement for Foiling the Thief.

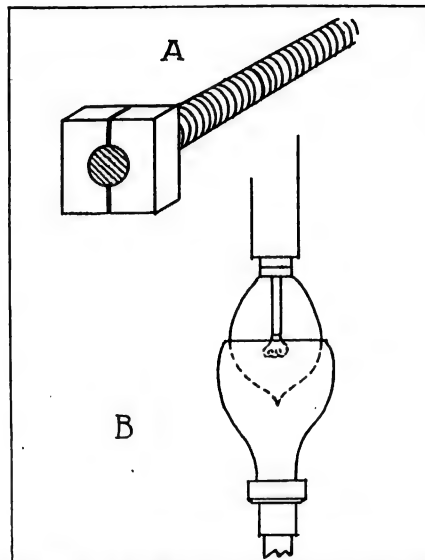


Fig. 366—A, Method for Holding Threaded Pieces. B, Light Globe Remover.

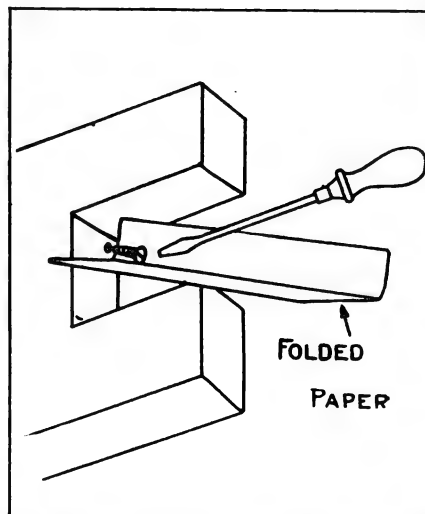


Fig. 367—Suggestion of Method to Use in Replacing Small Screws.

found at the points where the timer wiring is connected with the timer in the Ford car. Obtain a piece of circular loom (the largest size) at any electrical supply house, long enough to extend from the dash board to the timer and once around it, and starting about half an inch from the end cut four holes through one side just large enough to slip over the timer binding posts, the distance between them being the same as the distance between the timer binding posts. Now connect the wires with the timer and pull one through each hole in the circular loom, winding the tube around the timer and pulling the wires tight to hold it in place. When all wires are pulled tightly in the tube and the circular loom slipped over the tops of the binding posts as shown in the illustration, it will be impossible for oil or water to reach the wires. The circular loom is flexible enough to permit easy turning of the timer.

HOLDING THREADED PIECES.

(Figure 366A.)

Unless great care is exercised in holding threaded portions of bolts, pipes, etc., the thread will be injured by the pressure of the clamps or vise used. Select a nut of the same pitch as the threaded portion, and cut it across as shown in the cut. Put the nut in place and the clamp or vise may be screwed up tightly without injuring the threads.

LIGHT GLOBE REMOVER.

(Figure 366B.)

Half of a horn bulb mounted on an end of a long stick will enable one to reach the light bulbs that are out of reach on the ceiling of the garage, without resorting to the step ladder method. The rubber allows a firm grip on the globe and will not slip while being turned.

SMALL SCREWS.

(Figure 367.)

We publish another suggestion of a unique and handy method for inserting small screws in inaccessible holes. The illustration is self-explanatory, a piece of folded paper or thin sheet tin may be used. The same method may be used for guiding cotter pins or valve pins into their place.

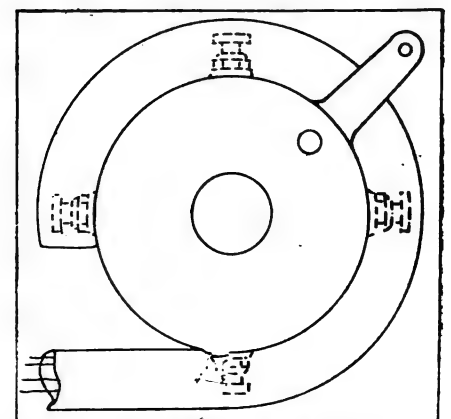


Fig. 368—Suggestion for Method of Insulating Ford Car Timer.

Pleasure Car Not Lost In This Tractor



Ford Runabout Converted with the Knickerbocker Unit Into a Light Tractor—
Reconversion Can Be Made in 15 Minutes.

AT A TIME when the development of the country's agricultural resources is of greatest import, the announcement of an attachment that will turn anyone of the million odd Fords in the country into an efficient tractor for all kinds of cultivation purposes is particularly significant and of great importance to the farmer. This device, which is called a Forma-Tractor, is simple in construction, but sufficiently rugged to stand the strain of the work in the field, and has the efficiency of a four-horse team for ploughing and cultivating and haulage purposes. It will not only permit the farmer to handle his cultivation problems with great economy and dispatch, but is so adapted to his Ford that it can

be attached or detached within less than 30 minutes, and therefore will not deprive him of the use of his car as a pleasure vehicle or for carrying produce to the market.

The Forma-Tractor is made by the Knickerbocker Motors Co., Ltd., New York City, and sells for \$178.

tion in the past the railways of the tropical or sub-tropical half of the inhabited world total but 112,000 miles, while those of the temperate half are 638,000 miles. The world has, outside the polar regions 750,000 miles of railway, and 50,000,000 square miles of land surface, or an average of 15 miles of railway to each 1000 square miles of land area, but the railways are so unevenly divided between the temperate and tropical sections that the tropical half has but $4\frac{1}{2}$ miles of railway for each 1000 square miles of land surface, while the temperate zone half has $25\frac{1}{2}$ miles of railway for each 1000 square miles of land surface. That the growth of commerce is dependent upon the presence of railways for land transportation goes without saying, and that railways cannot perform their service without the co-operation of animal or mechanical power in transporting products from the farm, or forest, or mine, or factory, to the railway, is equally apparent; with animal power unable to perform this service in the tropics that half of the world has had to await the development by man of a system by which mechanical power can be used.

It is just 100 years since Daniel Dod, a Virginia builder of steam engines, came to New York and co-operated with Francis Fickel, a builder of sailing vessels, in the construction of a steamship, the "Savannah," which in 1819 showed to the astonished world the possibility of crossing the ocean by steam power. The railway experiments in progress at the same time resulted in the establishment in 1820 of the steam railway. In the 100 years since that time world international commerce has grown from \$1,500,000,000 to \$45,000,000,000. The future possibilities of the horseless vehicle for transportation of merchandise may be as great today as were those of the steamship and railway a century ago. If the practical development of the horseless vehicle for land transportation and the flying machine for exploration, travel and communication should render practicable the commercial development of the tropical half of the world's land area, their value to man would far exceed the cost of the war, in which their practical qualities have been made apparent.

Automotives in South America

Modern Facilities for Transporting Goods Will Soon Transform the Business of the Tropics

THE industrial and commercial development of the tropical half of the world may be one of the most important results of the present war, was shown by O. P. Austin, statistician of the National City Bank of New York in an address on geography and commerce before the New York Chapter of the American Institute of Banking recently.

The tropical sections of the world, said Mr. Austin, now supply but one-sixth of the world's international commerce, although they have one-half of its area and one-half of its population. The area lying between the 30th parallels of north and south latitude, all of which is tropical or sub-tropical, has 800,000,000 people on its 25,000,000 square miles of land surface, while the temperate areas have 850,000,000 people on 25,000,000 square miles of land surface. Yet the international commerce of the tropical half of the earth's surface is but \$6,500,000,000 per annum, while that of the temperate area, with an equal population and land surface, is \$33,500,000,000, these figures representing international trade in 1913, the year immediately preceding the war. The international commerce of the tropical half of the world's area (exclusive of the polar regions) averaged \$260 per square mile, and that of the temperate area \$1300 per square mile. The commerce of the tropical section averaged \$8 per capita for its entire population, and that of the temperate section \$39 per capita.

This failure of the tropical sections of

the globe with a greater producing power per acre or square mile than that of the temperate zones is due, he said, primarily to lack of facilities for transporting products from their place of production to the common carrier, whether railway or steamship. In the development of the temperate zones this service of transporting products to the common carrier was rendered by the faithful horse, whose place is now being taken by the commercial automobile and in roadless areas by the caterpillar tractor. The horse could not be used for transporting products in the tropics by reason of the inability of animal power to cope with climatic conditions. Hence the comparatively slow progress of development of production and commerce in the tropics during the last century, in which world development of industrial and commercial activities has increased international trade from \$1,500,000,000 in 1816 to \$45,000,000,000 in 1916, most of this great growth having occurred in the temperate zone half of the world.

Capital, which is already sending steamships to the ports of the tropical areas the world over, stands ready to construct railways to develop the interior of tropic zone just as it has done in the temperate zone, but railways are useless unless the natural products can be moved from the place of production to them, and this has thus far been impracticable in the tropics because of the inability of animal power to render in that climate the service it gave in the temperate zones. As a result of this condi-



FLAG HOLDER.

A unique flag and pennant holder for motorists desiring to show their patriotism by displaying the Stars and Stripes on their cars, is being marketed. The holder is secured to the filler tube of the radiator by a novel band arrangement, which is securely locked in place by the fingers, and is adjustable to all makes of pleasure cars and trucks. One of the features of the design is that the flag holder proper may be set and locked in any desired position with the fingers and two or more flags may be used. The design takes flags up to and including $\frac{1}{4}$ inch in diameter, and does not interfere with the removal or replacement of the radiator cap.

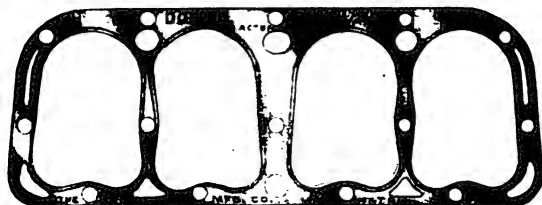
Manufactured by the Shattuck Mfg. Co., 100 Park Place, New York, N. Y. Price, 25 cents each. Special proposition for dealers.

AIR VALVE SPARK PLUG.

The Blue Ribbon automatic auxiliary air valve spark plug is a plug which has just been introduced to the trade as a plug with a special feature never before applied in spark plug construction. An automatic auxiliary air valve is fitted in the side of the plug, which automatically opens and closes with the working of the engine. Through a graduated inlet hole in the air valve cage, air is drawn on the intake stroke of the engine, through the spark plug body into the combustion chamber, this air inlet being opened and closed by a lever attached to the valve cage.

In installing a set of these spark plugs in an engine the levers regulating the air are connected with the gasoline throttle and accelerator, being automatically controlled in this way, according to the gas supply and speed of the engine.

It is claimed for this plug that it always insures perfect ignition, due to the fact that the suction of air through the spark chamber keeps the passage and porcelain absolutely clear of all short circuiting substances, and admits just the proper amount of air to form a perfect



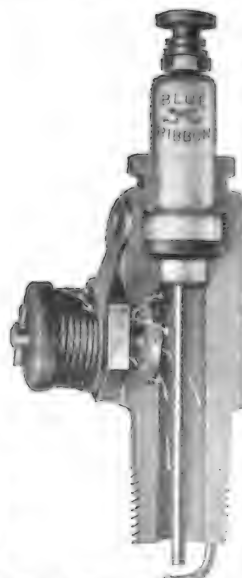
A Never-Leak Gasket.



Flag Holder.



Action of Lennon Light Protector.



Blue Ribbon Spark Plug.

mixture of gas, at the same time showing a large saving of gasoline. It is likewise claimed that this spark plug eliminates oil pumping troubles and irregular engine firing.

Manufactured by International Spark Plug Co., Inc., Indianapolis, Ind. Prices and literature upon request.

THE LENNON LIGHT.

The Lennon light, patent rights to which have just been affirmed by the United States Court of Appeals, is a flexible brass reflector, heavily plated, which throws the beams of light on the road and at the approved height from the ground stops the glare which is prohibited by statute in many states. It is made in two sizes and will fit any headlight. The protectors are light in weight and simple of construction, having no springs or extra parts to become broken. They are attached without removing the bulb from the headlight, the operation being to place the eyelet of the protector over the tip of the bulb and pressing it into position, where it is held firmly. Those rays of light that ordinarily would be thrown outward and upward into the eyes of oncoming motorists and pedestrians are reversed and directed downward. The patent rights have been purchased outright by J. H. Faw, Inc., and the business of the manufacture and sale of this reflector is now exclusively in their hands.

Manufactured by J. H. Faw, Inc., 41 Warren St., New York City. Retail price, per pair, \$1.

CORK TRANSMISSION LINING.

At the present time cork is being used extensively in automobile manufacture. Its resiliency, liquid repellant and frictional properties make it a very acceptable and useful product. The latest use is as an insert for transmission lining. This product is sold as a lining for the Ford car transmission bands. The base



Cork Insert Transmission Lining.

of the lining is formed of special imported fabric in which circular pieces of cork are inserted at intervals. The surface of the cork extends above the face of the lining to a very slight extent so that the initial engagement with the transmission drums is made on the cork, the load being taken up by the fabric lining as soon as continued pressure compresses the inserts to its level.

Manufactured by the Advance Automobile Accessories Corp., 56 E. Randolph St., Chicago, Ill. Prices upon request.

NEVER-LEAK GASKETS.

To operate successfully, all joints between casting blocks of an engine must be gas and compression tight. The usual method adopted for accomplishing this is the placing of gaskets between the surfaces. The illustration shows two standard cylinder gaskets made of copper, with a layer of asbestos fabric between the surfaces. These gaskets are carefully made and reinforced at the vital points. They may be obtained for a great number of standard cars and are cut to fit, requiring no alteration. The same firm also manufacture gaskets for practically every part of the engine where packings are necessary.

Manufactured by the Fitzgerald Manufacturing Co., Torrington, Conn. Write for catalogue and prices.

WARNER WHEELTILT.

The Warner wheeltilt consists of two hinged castings, the lower of which fastens on the steering post after the Ford wheel has been removed, and to the upper casting the wheel is attached, held there by the Ford steering wheel nut. A locking latch securely locks the wheel when in driving position by virtue of a spring back of the lock plunger. A slight pull on the latch releases the wheel so that it can be tilted upward to allow the driver room to leave or enter the car even when accompanied by a passenger in the front seat. Due to its simplicity it is assembled with a very few minutes work with a wrench.

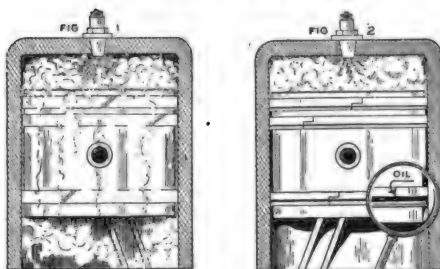
Manufactured by Warner Gear Co., Muncie, Ind. Price, \$1.50.

NO-LEAK-O PISTON RING.

Few motorists realize the havoc wrought to the engine by the refuse or coal oil which will not vaporize contained in gasoline escaping by the pistons into the crank case and decreasing the lubricating qualities of the oil therein contained. Engineers are trying to educate the motoring public to demand tight fitting pistons and rings so as to prevent this evil. Of course it is perfectly obvious that gasoline or coal oil is not a good lubricant and it does not take much speculation to determine what will happen to an engine if steps are not taken to prevent leakage into the crank case from the explosion chamber. A frequent draining of the crank case oil is to a certain extent helpful, but costly. The No-Leak-O oil sealing ring, which is being placed



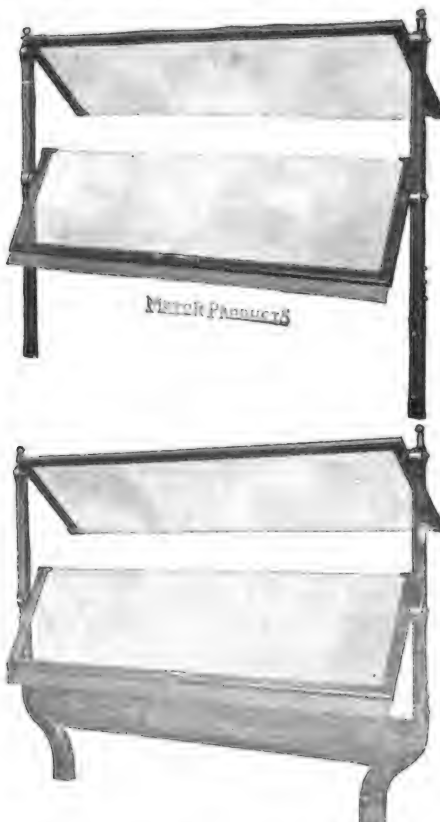
Warner Wheeltilt.



Application of No-Leak-O Piston Ring.



Cash Register of Contact Parts.



Two New Windshields.

upon the market, is claimed to remedy such evils, it being claimed that the deep groove cut around the face of the ring, with a scraping edge, in combination with the lap joint, forms a perfect seal of oil. That is to say, with a groove full of oil all around the ring the gas cannot escape, nor the refuse from poor gasoline get by it. The difference between the plain ring and the No-Leak-O ring is diagrammatically illustrated herewith. Not only does the No-Leak-O ring keep the gasoline from passing into the base of the engine, but also prevents the seepage of oil into the combustion chamber.

Manufactured by the Automobile Accessories Co., 816 W. North Ave., Baltimore, Md. Prices upon request.

TWO NEW WINDSHIELDS.

Two new windshields for Ford cars have just been announced by the manufacturers, to supply an insistent demand from body manufacturers and jobbers. The first of these shields is specially designed for use on Ford commercial cars. Its big feature is the elimination of stay rods, which usually form a part of Ford commercial shield equipment. The new shield, as may be seen from the illustration, bolts directly to a straight dash. Stay rods and clips are not needed, because the brackets hold the shield rigidly in place. Many new features of windshield design are embodied in this shield, which is rain vision and ventilating, thus insuring safety and comfort to the driver. The second is designed for Ford pleasure cars, and may be put on in place of the ordinary folding windshield supplied on Ford cars. It embodies the same features of the first shield and is a fitting complement to the line of special shields manufactured for earlier model Ford cars.

Manufactured by the Motor Products Corp., Mack Ave., Detroit, Mich. Prices upon request.

"CASH REGISTER" CONTACT PARTS.

The "Cash Register" of contact parts, which has been placed on the market to facilitate the handling of contact parts by dealers is a neat cabinet, seven inches high by 10½ inches wide by 14¼ inches long and contains four drawers, each having 19 compartments. Each compartment is labeled as to its contents, making it easy for the dealer to place his hand on any part without delay and also enabling him to keep track of his stock and to tell at a glance what he is short of and prevents over stocking of parts.

The assortment that it contains is arranged so that a full set of contact parts can be supplied for any one of 66 different makes of cars. The dealer has the privilege of exchanging the parts that do not sell readily for others for which there is a big demand. The "cash register" is given free with a purchase of parts totaling \$109.16, retail price, subject to dealer's discount.

Made by Paul G. Niehoff & Co., Inc., Dept. A., Metallurgical Laboratories, Chicago, Ill.

EXTENSION PEDAL.

One looking for comfort in the automobile will investigate a new device which is being placed on the market which not only adds comfort, but is a convenience, as well as a safety device. It is an actual utility in that it provides a means by which persons of different height can drive the same car without trouble. Two pedal adjustments are provided, a feature which gives quite a welcome relief in touring, as it is possible to rest the feet by changing from one pedal to another. As a matter of safety no short legged driver can afford to be without the device by which a long pedal reach is shortened and the pedals rendered accessible. It does not interfere in any way with the use of the regular pedals. The manufacturers are confident that the device fills a decided want and will be glad to send a pair on trial to be returned in 30 days if not satisfactory.

Manufactured by American Car Accessories Co., 537 West 21st St., New York, N. Y. Price, \$5 per pair.

OIL COCK WRENCH.

Every Ford car owner who has been obliged to reach beneath his car to find out the level of oil in the crank case by opening the petcock in the transmission case, thereby getting his clothes soiled by dirt or oil, will appreciate the utility of the tool illustrated. It is called the Dow crank case oil cock wrench. As the handle is 25 inches long, with this tool the oil cocks may be opened and closed without reaching by hand underneath the car. It is well made and finished in black enamel. This tool is also useful for opening or closing the cock on the bottom of the radiator.

Manufactured by Dow Wire and Iron Works, Inc., Louisville, Ky. Price upon request.

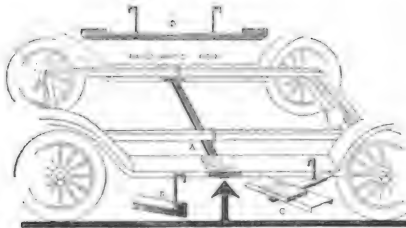
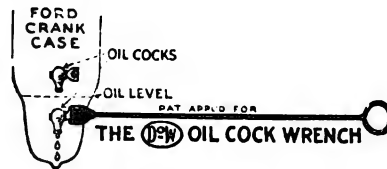
OSPECO WINDSHIELD PARTS.

No car being considered as having a complete equipment without a windshield, the usefulness of the windshield depends directly upon its flexibility and different adjustments. The Ospeco windshield parts are designed for converting the present Ford non-adjustable windshield into an adjustable one. They consist mainly of two side brackets and four friction hinges, which can be attached to the Ford windshield in a very few minutes by merely removing and replacing several screws, thus making a perfect clear vision, ventilating and slanting windshield.

Manufactured by the Ospeco Mfg. Co., Inc., Detroit, Mich. Price \$5 complete.

BAY STATE AUTOKIT.

The car owner, as well as the repair man, needs a set of socket wrenches. The repair man should have a complete set, one that will cover the range of standard and special bolts found in the various cars. The owner needs a set designed to fit bolts upon his particular



Dow Auto Body Brace.



Ospeco Windshield Parts.



Bay State Autokit.



Extension Pedal.

machine. This want may be filled with the Bay State Autokit, sets of such wrenches designed for saving time and money, fitting practically every bolt, nut or cap screw of any car or truck now on the market. Illustration shows a Ford car outfit complete with 10 sockets and a shank with ratchet, compactly packed in a neat box for the tool kit.

Marketed by Geo. A. Cutter, Taunton, Mass. Ford car outfit \$4. Other prices upon request.

DOW AUTO BODY BRACE.

The ideal of car construction toward which all manufacturers are striving is so to build an automobile as to have all parts act together as one. To a certain extent this is just what the Dow body brace for Ford cars is designed for. The device consists of a main brace made of steel angle, which is clamped to the car frame, crosswise and underneath the running boards. By its use two things are accomplished. The running boards are strengthened and the body is firmly attached to the chassis. In addition, it is said that road shocks are absorbed by it, and squeaks and rattles effectually silenced.

Manufactured by Dow Wire and Iron Works, Inc., Louisville, Ky. Prices and literature upon request.

RESISTOIL AIR HOSE.

An important item both about the automobile and the garage is the air hose. Rubber is very susceptible to compressed air and oil fumes and becomes porous after a period of use from friction and impurities of the air passing through it. The Resistoil hose in outward appearance is very much like any five-ply air hose, but the real value and wearing qualities is in the inner tube and the special construction of the outer walls. This hose is designed to stand the wear and overcome the sources of annoyance to every user of compressed air.

Manufactured by Brunner Manufacturing Co., Utica, N. Y. Prices from 16 to 27 cents per foot according to size.

THE MAXOTIRE.

Tire expense is the constant trouble of the motorist. Tire trouble is one of the greatest enemies of automobile comfort and every automobile owner is constantly on the alert to prevent in every way this form marring the pleasure of the journey. In the Maxotire the manufacturers think that the great problem is solved and that tires can be made to give greater mileage without annoyance if their product is used. The Maxotire is not a reliner, in any sense of the word, it is really a separate shoe which is fitted between the ordinary shoe and the tube.

One edge of the Maxotire is made like a straight side tire, having a very tough endless steel hoop, which is laid in the rim and fits snugly to it. It is impossible for this side to pull up or blow out. The opposite side of the Maxotire has no hoop in it, but is made very wide so as

to cross between the tube and rim and up to the other side of the tire past the hoop, completely encircling the tube, and affording protection to it from rim pinches and chafing. Offering the protection that it does, Maxotire may be used with good results in blown out shoes, greatly increasing the mileage and reducing the cost.

Manufactured by K. & W. Rubber Co., Third St., Ashland, O. Send for prices and catalogue.

G. L. W. SPRING OILERS.

The G. L. W. automatic spring oilers consist of a high grade felt pad with an oil reservoir, contained in a rust proof polished blue metal case. This case snaps over the main leaf of the spring and is so constructed that different degrees of pressure is brought to bear on the felt pad, making the ends perfectly tight and oil proof, thus keeping the top surface of the main spring perfectly clean. At the sides the pressure on the felt is such that it permits a very slow seepage of oil, which fills the grooves along the entire side and is carried between the leaves by capillary action. Engineers are universally conceding that a large per cent. of automobile trouble is due to imperfect lubrication of springs and modern machines are being fitted with spring lubricating systems. This being the case, it is therefore practical that every operator fit his automobile spring sets with some sort of spring lubricating device. The manufacturers of this accessory allow a 30 days trial, with money refunded, if not satisfactory, and in addition to this make a sweeping guarantee to replace any spring on any automobile, if broken after a set of G. L. W. automatic spring oilers has been in use on the car springs three days.

Marketed by the Hudson Sales Co., factory branch G. L. W. Spring Oiler Co., 7 East Jackson boulevard, Chicago, Ill. Price 20 cents each.

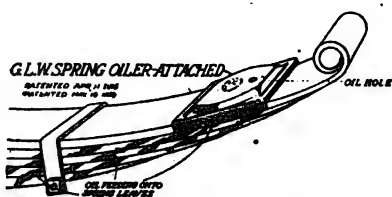
M-P PISTON RINGS.

Of one-piece construction, the M-P piston rings are guaranteed by the manufacturers to produce perfect compression when installed in cylinders that are not warped or scarred. This ring is made of special close grain gray iron casting and machined to within .001 part of an inch of specified dimensions. The illustration shows the simplicity of design and one-piece construction.

Manufactured by the Metal Products Co., 919-21 N. Market St., St. Louis, Mo. Prices for four inches in diameter and under \$1. 4 1/16 inches to five inches in diameter, \$1.25.

GASCO ECONOMIZER.

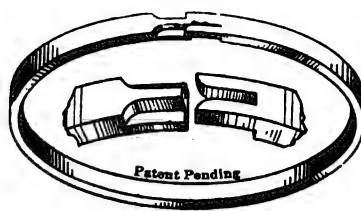
Every driver has at some time or other experienced trouble due to improperly vaporized fuel. Gasoline condensing in the intake manifold in drops results in a number of engine "ills" such as carbon deposit, loss of power, loss of flexibility



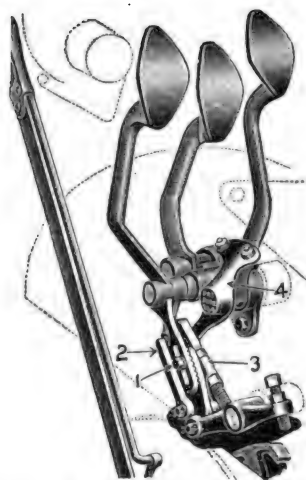
G. L. W. Spring Oiler Attached.



Gasco Economizer.



M-P
M-P Piston Ring.



Automatic Simplifier Attached.



Application of Friestedt Hydronizer.

and difficult starting. The Gasco gasoline economizer is a device which is attached between the carburetor and intake manifold and designed to vaporize the fuel passing through it, breaking it up into a spray which is readily mixed with the air passing through it. It consists of gasket to which is fastened three conical shaped screens, one within the other. The gas mixture passing through the screens is thoroughly broken up, forming a vapor. A 30-day trial of the device is allowed. If not satisfactory, upon return of the article money is refunded.

Manufactured by the Gasket Supply Co., 18th and Ludlow Sts., Philadelphia, Penn. Price \$1. Special proposition to dealers.

FRIESTEDT HYDRONIZER.

More miles per gallon of fuel, carbon not only prevented, but removed, clean spark plugs and a smoother running engine are some of the outstanding features claimed for this device. It operates automatically, from the moment the engine is started until it is stopped. Air is drawn in through the top of the device and thence through the water in the reservoir. In passing through the liquid the air is saturated with water and is drawn into the engine through the manifold connection in the form of water vapor.

Manufactured by Friestedt Manufacturing Co., 2934-38 W. Lake St., Chicago, Ill. Price complete as illustrated, \$6.50. Ten days trial. Special proposition for dealers.

AUTOMATIC SIMPLIFIER.

A new device for simplifying the driving of the Ford car is being placed upon the market. By its use full control of the car is through but one pedal. The action is entirely automatic and the engine cannot be "killed" by quick application of the service brake. As the brake pedal is pushed forward the high speed is automatically released and held in neutral position until released by a slight touch of the foot. The action of low and high speeds through the pedal is not changed, but immediately the brake is applied a neutral speed position is obtained. The emergency brake need not be used except as an additional precautionary measure. The reverse is obtained as usual, but with the attachment, it is unnecessary to hold the clutch pedal at neutral. The device is easily and quickly installed on any Ford car without drilling any holes.

Manufactured by Marion Metal Products Co., Marion, Ind. Price, \$5.

THE WILMO MANIFOLD.

The prices quoted in the Automobile Journal of April 10, 1917, on the Wilmo Manifold were not from the schedule then in effect and should have read "prices range from \$7.50 to \$15, according to make of car."



Armed Camp Window Display Constructed in Detroit Branch of Prest-O-Lite.



Brookline, Mass., Drug Store Shows Owners a Popular Car Polish in a Tasty Display.

Battery Parts Make a Fort

Prest-O-Lite Present Unique and Timely Military Display in Window of Its Detroit Branch

BECAUSE of its timeliness, one of the attractive window displays pictured herewith created unusual attention and comment. It was used in the window of the Detroit branch of the Prest-O-Lite Co., Inc. Aside from the show cards, which were done in red, white and blue, the display is made up entirely of Prest-O-Lite batteries, battery parts and accessories.

Gotten up in the form of a military camp, a number of "tents" were built of battery plates and the camp protected by an "entanglement" of cell connectors. Prest-O-Lite batteries were arranged in the form of a fort on which were mounted hydrometer "guns." The "guns" were manned by battery experts, who were supplied with plenty of ammunition in the form of distilled water, testing apparatus, etc. A card read, "Enlist now in our army of satisfied customers."

DRUG STORE DISPLAY MADE BY VICTROLENE.

The Victrolene Company, 39 Pearl street, Boston, Mass., makers of Victrolene car polish, which gives a high luster to the finish on automobiles without leaving a greasy surface to collect dust and dirt, has attracted widespread attention to its product through the conspicuous exhibits given at auto shows and in retailers' windows. A display of Victrolene in the drug stores of J. L. McGowan, Brookline, Mass., recently brought many customers into the store, who immediately became purchasers upon learning of the quality of the product and its superiorities amongst car polishes.

BIG RACE MEET FOR CINCINNATI COURSE.

The Cincinnati Speedway officials have prepared a programme of automobile

races for Decoration Day at that course which should prove one of the most entertaining cards in the speedway line that has ever been staged. There will be three preliminary races.

Prior to the 250-mile event for which a purse of \$25,000 is offered, divided into \$10,000 for first, \$5000 for second, \$2500 third, \$1750 fourth, \$1500 fifth, \$1100 sixth, \$900 seventh, \$800 eighth, \$750 ninth, \$700 tenth.

The opening events will include a special race for Fords, stock chassis, 20-mile event and invitation race of 30 miles for class E non-stock cars.

Entries announced for the main event are: S. Ostweig, Ostweig special; Ralph Mulford and Ira Vail driving Hudson Super-Six specials, and Omar Toft in an Omar special.

REPORT BIG MERGER OF AUTO MAKERS PENDING.

It has been reported in New York that negotiations are under way to merge the Maxwell Motor Co., General Motors and the Studebaker Corporation. Nothing definite has been given out, but it is understood that powerful banking interests have been working on the project.

COMING EVENTS

AUTOMOTIVE MEETINGS.

American Society of Mechanical Engineers, annual spring meeting, Cincinnati, O. May 22-25
American Automobile Association, directors' annual meeting, Cleveland O. May 25
Society of Automotive Engineers, summer meeting at Washington, D. C. June 25-26

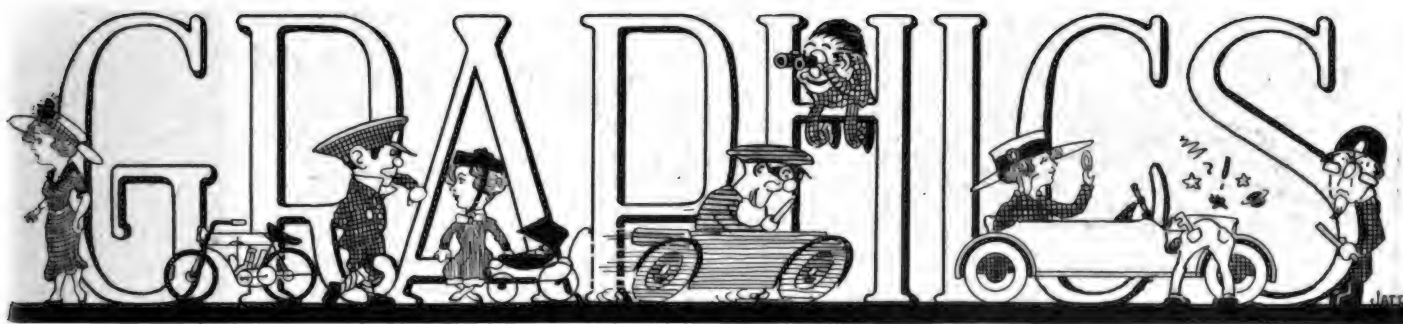
AUTOMOBILE RACES.

New York, Sheepshead Bay, Speedway, Metropolitan. May 19
Walla Walla, Wash., Track. May 20
Uniontown, Penn., Speedway. May 20
Chicago, Ill., Championship, Speedway. June 9
Cincinnati, O., Speedway. June 23
Omaha, Neb., Championship, Speedway. July 4
Spokane, Wash., Track. July 4
Tacoma, Wash., Speedway. July 4
Uniontown, Penn., Speedway. July 4
Visalia, Cal., Road Race. July 4
Benton Harbor, Mich., Track. July 4
Des Moines, Ia., Speedway, Championship. July 14
Rochester, N. Y., Hill Climb. July 14
Missoula, Mont., Track. July 15
Buffalo, N. Y., Intercity, Road. July 17-19
Anacosta, Mont., Track. July 22
Tacoma, Wash., Championship, Speedway. July 28

Great Falls, Mont., Track. July 29
Kansas City, Mo., Speedway (dirt). Aug. 4
Billings, Mont., Track. Aug. 5
Elgin, Ill., Road Race. Aug. 19
Spokane, Wash., Interstate Fair. Sept. 3-4
Cincinnati, O., Championship, Speedway. Sept. 8
Red Bank, N. J., Track. Sept. 8
Pikes Peak, Col., Road Climb. Sept. 9
Milwaukee, Wis., at State Fair Park. Sept. 9-15
Providence, R. I., Championship, Speedway. Sept. 15
Allentown, Penn., Track. Sept. 27
Trenton, N. J., Track. Sept. 28
New York, Sheepshead Bay Speedway, Championship. Sept. 29
Uniontown, Penn., Speedway. Sept. 30
Kansas City, Mo., Speedway. Oct. 6
Uniontown, Penn., Speedway. Oct. 6
Danbury, Conn., Track. Oct. 6
Chicago, Ill., Speedway, Championship. Oct. 13
Richmond, Va., Track. Oct. 13
New York, Sheepshead Bay Speedway. Oct. 27

SHOWS AND CONVENTIONS.

National Association Automobile Accessory Jobbers, Convention, Summer meeting, at Homestead Hotel, Hot Springs, Va. June 4-6
Milwaukee, Wis., first annual used car show. April 20-26
Chicago, Ill., used car show. May 7-12



A novel method of holding up auto-ists has been adopted by highwaymen in Pennsylvania. A tire is placed in the



road at the spot selected for the holdup and when the motorist gets out, thinking he has made a lucky find, the foot-pad steps up and either presents a gun or gently lulls the unsuspecting victim into a state of coma with a tap on the head with a black jack.

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The Motor Club of Brooklyn, N. Y., recently held a very successful minstrel show, in which the members participated as the minstrels. Over 300 members and their friends attended the show, which



was followed by dancing.

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Nearly every city now has its automobile grave yard, which is usually a vacant lot where the junk men throw the old frames after all the valuable parts or fittings have been recovered. From a sentimental viewpoint these yards hold the relics of many romances and events, as side by side, will be found the remains of a flivver that served its master well,

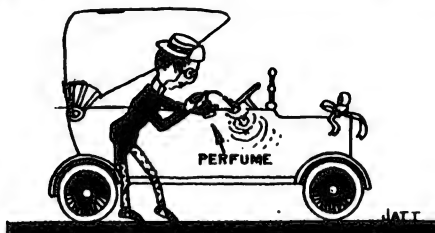


together with the twisted and wrenched frame of a \$5000 speedster that took its master to death when he attempted to

utilize all its speed in taking an angle of 45 degrees.

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A gasoriferous aroma is no longer the fashion in motor car perfumes. Up-to-date accessory dealers are now selling perfumes that are suitable for dolling up the car and they have staying qualities, keeping fresh for a year. There was a time when the owner relished the smell of the gas and gloried in the grease and grime-besmeared hands, as there were few who could afford the luxuries of a motor car in those days and his be-smearred attire was evidence of his



wealth. But that condition no longer obtains. Now the owner is as dainty about his appearance and motor car as with his wardrobe. The car must be scented with musk, attar of roses, or some other perfume befitting the luxury of the car's upholstery and finish.

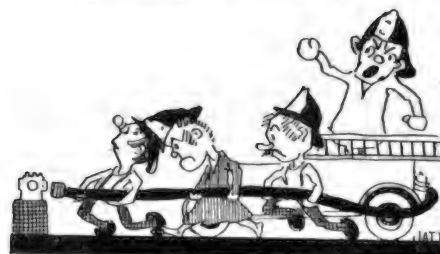
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Out in Nebraska the motorists lay considerable stock and store in their registration numbers. So much so in fact that some of the numbers command ex-orbitant premiums. One motorist had



coveted the "No. 1" registry for a long while and continued to bid for it, but the previous owner, having the sense of the horse trader, knew that his opponent wanted the article so badly that he would pay a high figure. No one seems to know just why so high a value was placed upon the number unless it had some cabalistic meaning to the purchaser, but he parted with \$600 to gain possession of it and now rides around seemingly as though a big weight had been lifted from his mind. Nebraska puts its auto tax receipts into road improvements.

A Chicago fire engine crew which has a combination motor operated engine, recently established a record in getting into



action. At the command of the assistant chief the crew leaped from their beds into their fire togs and were soon throwing a stream of water with 100 pounds pressure through a 300 foot lead of hose. Only 21 seconds elapsed from the time the command was given until the stream was in motion.

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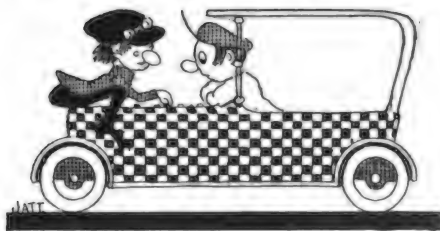
When challenged to take down and assemble correctly a Chalmers 6-30 motor, Miss Esther Jarret immediately accepted the challengers bet of a set of furs and



donned a pair of overalls. She took up her task earnestly and stuck to it until the engine had been taken apart and re-assembled in running condition.

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A Worcester motorist has succeeded in producing a novel and striking car finish by reproducing a design in black and white. This pattern is carried out all over the body. The running gear, running boards and mudguards are finished in white with black stripings. In case of a blowout, while they were waiting



for a shoe, the occupants might, if provided with checkers, have a friendly game.



Pleasure Cars Delivered by the Kissel Motor Car Co. of Hartford, Wis., Mounted on a Truck Caravan, Which Made an Overland Drive of 1300 Miles to Baltimore, Md.

The Business Side of the Motor Vehicle Industry

What Several of the Leading Car and Parts Makers, Production and Sales Organizations, and Allied Lines Are Doing or Have Under Consideration.

The Kissel Motor Car Co., Hartford, Wis., recently delivered four pleasure cars in a unique overland dealer delivery. They went from the factory as freight in a caravan of nine motor trucks something more than 1200 miles to Baltimore, Md. Normally the trucks and cars would have been sent as railroad freight to the Monumental Car Co., the Kissel dealer in Baltimore, but because of the railroad congestion there was no assurance of delivery by the ordinary transportation methods in weeks. The caravan, starting March 21, followed the Lincoln Highway a part of the way from Chicago. Fifteen days was allowed for the trip. All the units of the caravan arrived in good shape, all of the trucks having got through with their own power.

George W. Dunham, president of the Society of Automotive Engineers, has been appointed a member of the Tractor Board of the Ordinance Department, U. S. Army. The board, which will be composed mostly of army officers, will have charge of transportation of heavy artillery with tractors and will develop certain types for this kind of service.

The Hayes Mfg. Co., Detroit, Mich., earned \$60,180.79 during March of the present year, making a total for the nine months ending with that month of \$408,967. The company had a surplus at

the end of March of \$238,619 and cash on hand of \$95,764.

Harry L. Bill, formerly factory manager of the Disco Starter Co., at one time general manager of the Hayes Mfg. Co., and prior to that time vice president and general manager of the Springfield Metal Body Co., has been appointed works manager of the Chalmers Motor Car Co., Detroit, Mich. Mr. Bill is 35 years of age and was with the Chalmers company in 1909 as manager of the Chalmers racing team that secured the championship award from the A. A. A. contest board.

The Locomobile Company of America, Bridgeport, Conn., has established a factory branch in Providence, R. I., under the management of F. Roy Hiltz. The salesrooms are at 208 Broad street.

The Westcott Motor Car Co., Springfield, O., has advanced the price of the Westcott four-passenger roadster and the five-passenger touring car from \$1590 to \$1790. These models will hereafter be fitted with 35x4½ tires instead of 34x4 sizes.

The Universal Rim Co., Chicago, Ill., makers of Baker demountable rims, will separate the two departments of the business which heretofore have been known as the royalty and patent department and the wholesale and manufacturing department. The former department will hereafter be conducted under the

name of "The Universal Rim Company," and will have charge of all matters pertaining to patents, royalties and the licensing of factories to make Baker rims, while the wholesale and manufacturing department will continue under the firm name of Stone-Thompson Mfg. Co., which will handle the entire distribution of Baker rims and the manufacture of Stone Shock Absorbers, as well as the other automobile specialties which are being developed.

H. H. Doering, for the past three years manager of the Philadelphia branch of the Baker R. & L. Co., has been appointed sales manager of the company in charge of the distribution of electric vehicles. All models of the R. & L. electrics were advanced \$200 on May 1. The brougham is now listed at \$3000 and the double drive coach at \$3200.

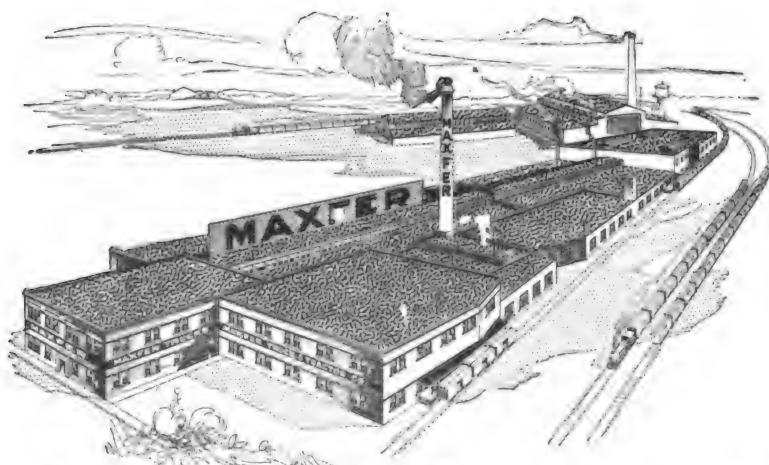
John J. Harter, president and general manager of the J. J. Harter Motor Car Co., and former president and general manager of the White Sewing Machine Co., died at his home in Pittsburg on May 1.

The Pierce-Arrow Motor Car Co. directors recently held their annual meeting and elected the following board of officers: President, Charles J. Clifton; vice president, Henry May; second vice president, W. J. Foss; secretary, L. H. Gardiner; treasurer, W. C. Wrye.

The Belmont Motor Co., recently incorporated under the laws of Delaware, has taken over the old buildings of the Lewistown tannery and will use them as a plant in which to assemble motor trucks.

The F. B. Stearns Co., Cleveland, O., has increased its capital stock from \$400,000 to \$2,000,000. It is reported that part of the increase will be in the form of a stock dividend of 210 per cent, giving the stockholders 3.1 shares for each share now held. There will be \$500,000 of the new preferred stock and \$250,000 of the new common sold to provide capital for carrying out a plan of expansion that has been decided upon.

The Maxfer Truck and Tractor Co. has purchased a new plant at Harvey, Ill., which has 10 times the manufacturing space of the old plant at Chicago. The additional manufacturing facilities and increased equipment in the new factory has made possible a daily production of nearly 300 Maxfers. Mr. Henry, general manager of the company, states that the materials on hand would enable another increase in the output by July. In less than 10 months the Maxfer sales and distributing organization has grown from



New Plant of the Maxfer Truck and Tractor Co. at Harvey, Ill., Which Has 10 Times the Manufacturing Space of the Company's Old Plant at Chicago.

several to over 1200 dealers, with representatives in all the principal cities in the United States, Canada and foreign countries.

The S K F Ball Bearing Co. of California, Inc., has been organized in that state and headquarters have been established at 341 Larkin street, San Francisco, for the purpose of handling the sale and distribution of S K F ball bearings on the Pacific coast. A. M. MacLaren will be in charge of the office. Any engineering data relative to the use of bearings in that territory can be obtained through the San Francisco branch.

The Wallace C. Hood Service Bureau, Detroit, Mich., has moved into new headquarters at 1199 Woodward avenue, in that city.

Fuller & Sons Mfg. Co., Kalamazoo, Mich., have appointed Gould Allen as sales manager of the company. He has had wide experience in the handling of commercial and pleasure car transmissions.

Harry L. Loop, Jr., has joined the sales force of the Rands Auto Co., Philadelphia, Penn., distributors of the Selden trucks. The company's headquarters are at 1805-07 Market street, in that city. Mr. Loop was formerly Philadelphia branch manager of the Chase Motor Truck Co.

George T. Theobald, famous as a race driver in this country and Europe, has secured the New York agency for the Jackson "Wolverine Eight." John H. Kracke, well known in the trade in that territory, is associated with Mr. Theobald.



Hugh Chalmers, President of the Chalmers Motor Co., Detroit, Mich.

Hugh Chalmers, president of the Chalmers Motor Co., handed G. D. Pope, chairman of the Detroit chapter of the Red Cross, a total of \$1887, contributed by the executives and workmen of the Chalmers company. This contribution was noteworthy through the fact that about 80 per cent. of the amount was contributed by the working force, a total of about \$34 from each department of the company. Detroit's plans in the Red Cross campaign were to secure \$175,000 and 100,000 or more members.

The Prest-O-Lite Co., Inc., has appointed the following individuals and concerns as battery service stations: Moler Auto Sales Co., Athens, O.; F. A. DeLong, Hutchins, Minn.; F. C. Higgins, 887 Rush street, Chicago, Ill.; Camden Motor Co., Camden, S. C.; Storage Battery Service Co., 131 E. Third street, Greenville, O.; Mitchell & Cory, Tama, Ia.; Seederly Battery Co., Salem, O.; Gentner & Collins, 701 G street, Grants Pass, Ore.; C. F. Yeakel, 643-645 E. Broadway, Alton, Ill.; Diamond Machine Co., 110 E. Michigan street, Michigan City, Ind.; Bills Auto Co., Blackfoot, Idaho; Glen G. Glead, East Aurora, N. Y.; Rakestraw & Walter, 6th avenue and Merchant street, Coatesville, Penn.; The

Ortman Motor Co., Market street, Washington C. H., O.; Downs Garage, So. Locust street, Dana, Ill.; The Electric Battery Service Co., Cumberland, Md.; D. & H. Sales Co., Main street, Arcade, N. Y.; Gardner Motor Co., Osage, Ia.; Perfect Storage Battery Co., Jamaica, L. I., N. Y.; Delay Brothers, 609-11 E. Broad street, Tamaqua, Penn.; Cote & Gordon Co., Box 94, Dayton, Wash.; F. E. Ganders, 5 So. First street, Walla Walla, Wash.; Valley Garage, Livermore, Cal.; David T. Keighty, 1130 Pacific avenue, San Pedro, Cal.; Sparks & Murphy, Third and C streets, Petaluma, Cal.; W. S. Killingsworth, Jr., Vacaville, Cal.; Damas & Francis, Washington street, Sonoma, Cal.; Fallon Garage, 204 Centre street, Fallon, Nev.; Selby's Garage, 208 Franklin street, Monterey, Cal.; California Garage, 897 Hignera street, San Louis Obispo, Cal.; Graffigna Bros, Lodi, Cal.; Lacey Garage, Salinas, Cal.; King City Garage, Broadway, King City, Cal.; Guarantee Battery Co., 407 State street, Santa Barbara, Cal.; Walker & Peterson Co., 2417-2419 Hewitt avenue, Everett, Wash.; State Road Garage, High and Adams street, Pottstown, Penn.; Taylor Garage, Inc., Maple avenue, Haverstraw, N. Y.; Noecker-Bulck Co., 150 E. Main street, Circleville, O.; Metropolitan Auto Co., Knickerbocker & Larson, proprietors, Dodgeville, Wis.; W. P. Klein, Copeland and Franklin, Woodlawn, Penn.; Service Electric Co., 38 W. Fourth street, Mansfield, O.; Tri State Battery Co., 411 Fifth street, Sioux City, Ia.

W. G. Rierison Smith, president of the Smith Motor Co., distributors for Locomobile and Stutz cars in Michigan, announces the appointment of J. B. Banta as supervisor of sales division of the company.

The Spranger Wire Wheel Co., Detroit, Mich., will occupy its new plant at Parkinon and Clayton avenues, some time next month.

The Paige-Detroit Motor Car Co., Detroit, Mich., earned \$417,140 during the first quarter of the current year, or about 26.6 per cent. on the common stock after deducting \$17,500 for preferred stock dividends.

The Southwestern Tire and Rubber Mfg. Co., recently incorporated at Dallas, Tex., with \$250,000 capital, is planning the erection of a plant to cost about \$80,000. The officers of the company are: President, R. L. Cameron; vice presidents, W. W. Taxis and L. G. Murray; secretary, W. E. Suttles; treasurer, J. G. Gillespie.

The Hoover Steel Ball Co., Ann Arbor, Mich., have prepared plans for the extension of the plant to cost \$250,000 by the erection of three new brick and concrete factory buildings. When completed the additional facilities afforded will increase the output to 40,000,000 balls annually.

The Eastern Motors, Inc., Hartford, Conn., is testing out the first Charter Oak car that has been completed and will begin deliveries to dealers in August.

The Premier Motor Corp., Indianapolis, Ind., has advanced the prices of both the Premier touring car and "Foursome" from \$1895 to \$1985.

The Simplex Automobile Co. has moved its main office to the same building with the metropolitan sales room, 755 Fifth avenue, at 58th street.

The Allen Motor Car Co., Fostoria, O., has started work on the Dale Body Co.'s new plant, the first building to be erected in Allendale Addition, the new automobile community being formed by the company on the outskirts of Fostoria. The main building, which will be exclusively for the manufacture of bodies, is to be 500 feet long and will provide 30,000 square feet of floor space. When completed and in operation the plant will have a capacity of 100 bodies a day.

E. H. Stickels, president of the Holt-Welles Co., Inc., has resigned and sold out his interests in the company to the Mal-leable Iron Fittings Co. of Branford, Conn., makers of the Branford carburetor. He organized the Holt-Welles Co. which put the Branford carburetor on the market and acted as the sole distributor. Mr. Stickels will open an office in the U. S.

Rubber building in New York as a manufacturers' distributor.

R. L. La Rue, formerly with the Northwestern Motor Sales Co., Minneapolis and St. Paul, has been appointed special factory representative of the Olymplan Motors Co., Pontiac, Mich.

George W. Cravens has been appointed chief engineer of the Elkhart Carriage and Motor Co., makers of the Elcar. He is one of the best known engineers in the industry and for a number of years has acted as consulting engineer for various companies, specializing in the development of automobile parts as well as complete cars.

The Ross Gear and Tool Co., Lafayette, Ind., has made a number of changes in the factory organization. J. P. McParland has been appointed superintendent of the machine shops to succeed J. N. Kelly, who resigned recently. E. L. Usner has been made assistant manager and Mr. M. C. Griswold superintendent of assembly.

The United Alloy Steel Corp., Canton, O., which produces a large percentage of the alloy steels used in the automobile industry, has recently opened 10 new furnaces, making a total of 17 now operated. No more orders are being booked for delivery this year as the orders at present on the books are sufficient to keep the plants going at utmost capacity for many months.

H. R. Keeling, formerly with the Armstrong Cork Co., Pittsburg, Penn., has been appointed advertising manager of the Haynes Automobile Co., Kokomo, Ind.



Alvan Macauley, President of the Packard Motor Car Co., Detroit, Mich.

Alvan Macauley, president of the Packard Motor Car Co., in a statement issued following the lifting of Red Cross contributions in Detroit, said that the Red Cross had sent out a letter to all its branches in the larger cities calling attention to the contribution made by the Packard organization. More than 75 per cent. of the Packard employees contributed to the fund. Their total donation handed to the Detroit chapter amounted to \$8824.

Alfred Thompson, formerly production manager of the Maxwell Motor Co. and the Hudson Motor Car Co., respectively, has been elected president of the Abbott Corp., Cleveland, O., to succeed Guy Morgan, who recently resigned.

Frank H. Shaw, representing banking interests in St. Paul, Minn., that have purchased the interests of John and Charles Lambert in the Regal Motor Car Co. of Detroit, has been elected treasurer of the company. H. H. Emmons, secretary of the company, who has joined the navy, has been succeeded by M. T. Boden. F. W. Haines remains as president of the company.



Fred A. Culver.

OPERATING in the centre of the city of Worcester, Mass., a manufacturing community which prides itself as being the "Heart of the Commonwealth" and is particularly notable in its productions in the metal trades, the plant of the Culver-Stearns Manufacturing Company, makers of automobile lights and automobile lighting specialties, is both distinctive and distinctively interesting. The plant of the company is in a spacious brick structure on Southbridge street, opposite the Worcester post-office, and without doubt it is one of the busiest places in the whole busy city. Furthermore, the Culver-Stearns Manufacturing Company, turning out as it does large and small wares for vehicle electric lighting by the hundreds of thousands, and employing more than 200 operatives in placing together the manifold parts which go to make up these articles, represent a business of magnitude that ranks foremost among the producers in their line and means that it is a most important industry both to the city of Worcester and to the automobile world.



Manufactory of the Culver-Stearns Mfg. Co., Makers of Auto Electric Lighting Specialties, Southbridge Street, Worcester, Mass., Employing More Than 200 Operatives in the Production of Their Specialties.

While New England did not develop its manufacturing business in the automobile industry as rapidly as the Middle West, although it was a pioneer in that industry, yet in the matter of furnishing accessories, equipment, parts and tools for building automobiles, its famous machinists and machine shops have kept for it a large place in the motor car industry. And in this development the activities of the progressive Culver-Stearns Manufacturing Company has played no small part. This company turns out annually hundreds of thousands of pieces of electric lighting equipment for automobiles. It specializes in this one particular line. It makes complete lamps and it makes parts. It has mechanical and electrical experts in its employ who devote their entire time and attention to designing and developing new, advanced ideas in the manufacture of lighting equipment.

Working Plant Extensively Equipped.

The plant of the company is extensively equipped for the production of these goods and particular stress is given to points of material selection and workmanship. The enormous production of the Culver-Stearns plant, its unequalled manufacturing facilities and its highly trained workers permits the sustained output of C-S high standard goods at popular prices. All material entering into the production of Culver-Stearns goods is of the very best quality. The brass tubing is seamless drawn; hard rubber of the finest quality is used; and these features are combined with accurate screw machine work and experienced assembling.

The product of this concern, although it has been in existence but eight years, is standard equipment on more than 75 per cent. of the cars manufactured in the United States. Besides contributing on so large a scale to the domestic motor car industry, with a big market in every state of the union among accessory dealers, the company was also developing its export trade

rapidly on a big scale until the conditions that arose incident to the European war made further export business to many countries to a large extent prohibitive.

Products for Lighting the Car.

The Culver-Stearns' products include practically everything for lighting the car. The famous Giant Searchlight and the Midget Searchlight are two of the most popular on the market.

Culver-Stearns fittings include plugs, connectors, lamp sockets of all descriptions, many of which are standard equipment on various makes of cars and are interchangeable.

The business was organized by Fred A. Culver and Jason C. Stearns, who formed a copartnership in 1909 and started operations in a small way with a shop located in one room where three men were employed. It was started on a basis of selling quality lamps direct to consumers, but so rapidly did the changes come in the lighting equipment field that their adoption as standards in the industry produced immense bulk orders from manufacturers and necessitated rapid and extensive expansion. In 1911 the company was incor-



A Scene in a Corner of Assembling Room No. 2, with Operatives Packing and Counting Plugs.

porated under its present name, Mr. Culver becoming president and Mr. Stearns treasurer and general manager. In the start they had grasped the changes taking place in the matter of automobile equipment and immediately began specializing in electrical fittings for lighting systems on motor cars. Oil and acetylene lamps were all that were used at the time. The new form of lighting at once showed its superiority over the old and advanced rapidly in the favor of the public. Thus, specializing in the manufacture of small electric lamps for cowl, tonneau and inspection lamps, spot lights, reflectors, sockets, connectors and plugs for automobiles, the business grew rapidly with the substitution by the motoring world of electrically lighted equipment for oil and acetylene lamps.

Company Makes Steady Growth.

The company came quickly into prominence as one of the first to manufacture and install the electric lighting system on a motor car. Their first product was a "tipover" attachment clamped to the kerosene burner, which converted it into an electric lamp. In this device the current for the bulb was taken from a



Interesting Hand and Machine Operations in the Spacious, Well Lighted Assembling Room No. 1.

storage battery. From that period to the present time the adoption of electric lights for motor car lighting has become general and the enormous business that developed for this form of equipment resulted in a rapid expansion of the Culver-Stearns organization, which, all the time continued to improve and specialize in its products. It acquired many patents, having at present upwards of 50 in the United States and abroad to cover various devices.

The one room shop has since grown into a plant of 25,000 feet of floor space, with four working floors and a warehouse, and with over 200 operatives in steady employment. By 1912 the business had grown to such a volume that a Detroit office was established so that the company could keep in closer touch with its largest market in the great centre of automobile production located in that city. Mr. Culver makes his headquarters there, devoting his entire attention to the selling end, while Mr. Stearns remains in charge of the big factory in Worcester, caring for the financial and production detail.

Factory Departments Hives of Industry.

The plant of the Culver-Stearns company any working day is a splendid view of busy industry and systematic production. At long rows of tables in the assembling rooms girls fit the small parts together as



Inspection Room of the Culver-Stearns Mfg. Co., Where the Finished Product Is Sorted and Packed.

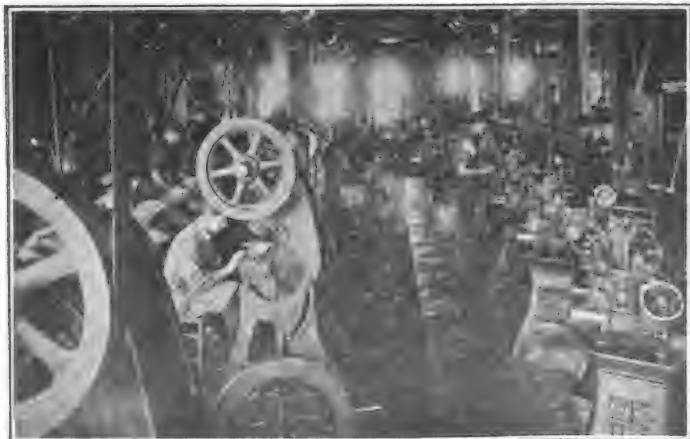


A View of the Drill Press Room, Showing Girls Drilling Contact Points by Machinery.

they come from the machinery departments. To a novice the bits of brass tubing, screws, etc., seem countless. Indeed they would be almost so when it is considered that the force is working on a 50,000 order here, a 200,000 order there and a 600,000 order over yonder. The soldering of sockets at a revolving table by operatives and bunsen burners, the placing of contact points in plugs by a machine operation are but a few among numerous interesting processes observable in the preparation of the product.

The machine shops illustrated on this page give interesting glimpses of these well arranged, well equipped departments. These departments of the plant comprise a large machine room, drill press room and tool room, arranged and administered for efficiency and the turning out of a quality product.

Sheer progressiveness and the sincere optimism manifested by the company in constantly expanding their manufacturing facilities stood them in good stead in 1916 when the metal scarcity found many makers of parts and equipment short of needed supplies. However, the Culver-Stearns Manufacturing Company was stocked heavily with the necessary metals for its product and were enabled to increase manufacturing operations last year and make better deliveries than at any time in their history. With a very complete stock at hand they likewise maintain that for 1917 they are in an equally favorable position to supply the trade high grade, superior goods from the famous line of Culver-Stearns electric auto lighting specialties.



View Down the Long Aisle in the Machine Room of the Culver-Stearns Mfg. Co., Worcester, Mass.

TAYLOR DRIVING NEWMAN-STUTZ WINS AT UNIONTOWN.

William Taylor of Los Angeles, driving a Newman-Stutz, won the speedway contest at Uniontown, Penn., May 10. The race, which was the first important one on the calendar for the season, was slow and devoid of any interesting features, the winner's time being 1:15:38 for 100 laps of the track, which is a mile and an eighth in length, making a total distance covered of 112½ miles.

Eddie Hearne, driving a Duesenberg, was second, in 1:16:11. The others finished in the following order: Louis Chevrolet, Frontenac; Boyer, Frontenac; Klein, Johnson; Lewis, Hoskins; Mulford, Hudson; Oldfield, Delage.

Ira Vail, driving another Hudson, lead during the first 26 laps and promised a fast pace, making 90 miles an hour at the time he was forced out when his car skidded on a turn.

DOBLE-DETROIT STEAM MOTOR COMPANY ORGANIZED.

The Doble-Detroit Steam Motor Company has



View Showing a Section of the Tool Room at the Plant of the Culver-Stearns Mfg. Co.

been organized at Detroit with a capital of \$1,000,000 to manufacture and market the well known steam car named for Abner Doble, the inventor. This car, which made a big hit at the national shows, will be handled by over 1100 dealers who have already contracted for over \$12,000,000 worth of the cars.

The General Engineering Corporation remains as a separate unit and will take care of the engineering work in connection with building the Doble.

CHICAGO'S USED CAR SHOW IS A BIG SUCCESS.

The used car show which opened in Chicago, May 5, and which will close on the 13th, proved a success from the start, a total of 50 cars being sold the first two days, with a total value of \$46,895, an average of \$985 per car.

About 120 cars are placed on view at one time and the cars that are sold are removed three times daily, being replaced with other cars. The cars were all thoroughly overhauled before being exhibited.



Revere Beach Boulevard, Boston, Mass.
Coated with "Tarvia A" in 1906 and 1907.

Eleven Years of Tarvia—

THIS road is one of the great automobile thoroughfares out of Boston, the favorite outlet to the North Shore and the beautiful coastal points of New Hampshire and Maine.

In 1906 the plain macadam used here was wearing out faster than it could be replaced. The up-keep cost was heavy and the dust was terrific, in spite of incessant tinkering and sprinkling with water.

In 1906 part of this road was coated with Tarvia and the surface was brought to a smooth contour at the same time, and in 1907 the remainder was treated.

Thereafter, the automobiles, instead of ripping up the surface, simply rolled it down and made it smoother, the dust disappeared, and automobiling became a pleasure.

As needed, the Tarvia treatments were renewed and the road has been and is in excellent repair.

During these ten years the expense has been insignificant—somewhere around 2c per yard per year—although the traffic is heavy, often exceeding 5000 vehicles a day, winter and summer.

Thousands of communities are paying five or ten times as much to maintain their macadam roads under one-tenth of the traffic that pours through Revere Beach Parkway.

Other road bitumens come and go; Tarvia is the only one in the market which has a record of over ten years of continuous and rapidly-enlarging service. The experimental period was passed many years ago. The application of Tarvia to different types of roads has become an exact science. There are five kinds of Tarvia now and a score of methods for using them.

Don't forget that Tarvia doesn't cost money; it saves money for the taxpayer by the great reduction in maintenance expenses.

Special Service Department

This company has a corps of trained engineers and chemists who have given years of study to modern road problems.

The advice of these men may be had for the asking by any one interested.

If you will write to the nearest office regarding road problems and conditions in your vicinity, the matter will have prompt attention.

Booklet on request. Address our nearest office.

The **Barnett** Company

New York Chicago Philadelphia Boston St. Louis Cleveland Cincinnati Pittsburgh
 Detroit Birmingham Kansas City Minneapolis Nashville Salt Lake City Seattle Peoria
 THE PATERSON MFG. CO., Limited: Montreal Toronto Winnipeg Vancouver St. John, N. B. Halifax, N. S. Sydney, N. S.



(When Writing to Advertisers, Please Mention The Automobile Journal.)



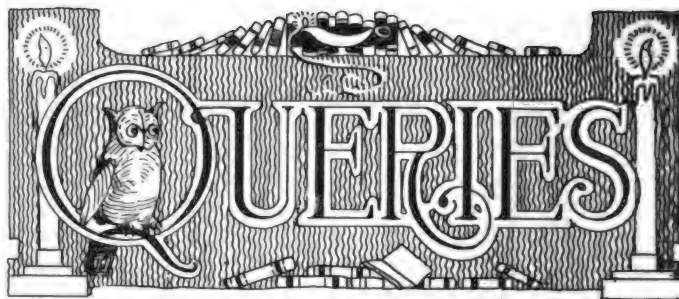
"What am I Feeding my Engine?"

Carbon, the greatest detriment to engine efficiency, may be minimized by the proper choice of lubricants. For instance—

SUPREME AUTO OIL

being manufactured from Asphalt Base Crude, leaves less carbon, as it contains no paraffine to gum and stick. At the same time it affords perfect lubrication.

GULF REFINING COMPANY
The Largest Independent Refining Company in the World
General Sales Offices: Pittsburg, Pa.
DISTRICT SALES OFFICES:
Boston New York Philadelphia Atlanta New Orleans Houston



NOTICE TO READERS.

THIS department contains the Mechanical Editor's answers to readers' inquiries. It is open to every subscriber. If any part of your car is not operating satisfactorily, or if you desire information regarding operating, maintaining or repairing motor cars, do not hesitate to lay your troubles before him. He will answer promptly and fully, either by mail or in these columns, as you direct. This service is free to every subscriber, and is often the means of saving considerable money that otherwise would be spent with a garage man. Letters should always be signed with the writer's full name and address, and the car or part in question should be properly identified, by mentioning the maker's name, model, year of production or other distinguishing feature. Address all inquiries to the Mechanical Editor.

THE AUTOMOBILE JOURNAL IDEA EXCHANGE.

For the benefit of readers of the Queries column it has been decided to conduct in this department a more widespread interchange of ideas. To this end the attention of readers is invited to the following question:

WHAT IS YOUR METHOD OF TESTING THE FORD CAR IGNITION SYSTEM FOR TROUBLE? (The answer to cover possible troubles from the magneto to spark plugs.)

To the writer of the best answer to the above question \$2.50 will be paid. The best answer received will be published in the second issue after the appearance of the question in the magazine. Answers to the question should be in the hands of the editors by the 5th or 20th of the month respectively. The contest is open to every subscriber.

REPAIRING BRAKE CAMSHAFT.

(G. W., Cohasset, Mass.)

Will you please tell me how to remove the hub camshaft, lever and bushing from a Ford model T car? Also what tools are necessary? How can I prevent the Holley carburetor from flooding?

The hubs of the brake levers are secured on to the camshafts by two pins in each, which pass through two holes in the levers and shafts and are peened or riveted so that they will not slip out.

File these heads off with a coarse file until the surface is even with the surface of the lever and drive out the pins with a punch or nail set. The brake lever may then be removed from the camshaft. After the wheel has been removed and the brake lever taken from the camshaft the shaft itself can be slipped from the bushing in the brake flange.

The old bushing may be removed by placing a short pipe nipple against the flange and by screwing a bolt into place as shown in the illustration at A, the bushing will be pulled out. All the tools and supplies necessary to do this work will be a hammer, a punch or nail set, a file and a weight to be placed under the lever so as to absorb the blows of the hammer as shown at B.

When a Holley carburetor floods the cause may be due to one of three: Too high a float level, fuel soaked float or imperfectly seated or leaking float needle.

If you will examine the carburetor you will find that it is constructed as follows: A float chamber which contains a cork float attached to a lever which controls a valve at the gasoline inlet. As the float rises when gasoline is admitted to the chamber the valve is automatically closed, so that when the fuel height is reached no more gasoline can enter.

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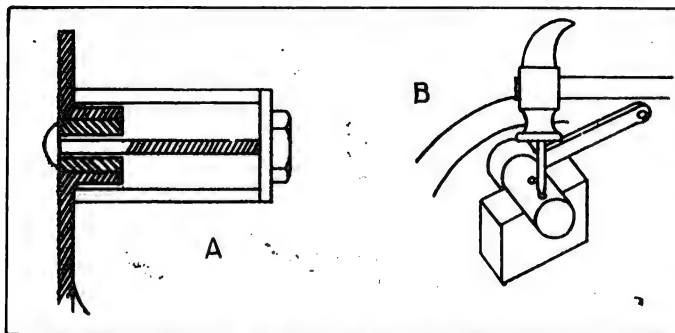
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As gasoline is drawn through the needle valve at the centre of the float chamber, the float drops and more gasoline is admitted through the float needle valve into the float chamber, thus keeping the fuel level constant.

Should a piece of dirt or waste become lodged between the float needle and its seat, the valve cannot close, but will admit gasoline through the needle valve into the mixing chamber that will flow to the ground through a drain. If the cork float becomes fuel saturated it will not rise to a height that will close the float valve. The same condition results when the valve is held open by dirt or waste. Sometimes the float arm may be bent so that with the float at its highest position the valve will not close. The cause for flooding may be easily determined. After disassembling the carburetor, remove the cork float from the arm, put it into a dish of gasoline and note whether it floats as does a new cork or is partially submerged. In other words, see whether it is saturated with fuel. If it is, put it in the sun for two or three hours, then into a warm oven (not over 100 degrees) for about an hour. Then remove it and apply two or three coats of grain alcohol shellac. Grain alcohol shellac resists gasoline better than shellac mixed with wood or denatured alcohol, though the latter are sometimes used if grain alcohol cannot be obtained.

Now hold the carburetor, with float valve and arm attached, upright in the hand and blow through the gasoline inlet. If the float arm is held up by hand the valve should be tight so that the air cannot pass through. If air does pass through when the float arm is held up, then the valve does not fit or is obstructed. If the valve is worn, it may be necessary to grind it into its seat with a very fine grade of emery or grinding compound in the same manner that an engine valve is ground. (Full directions for this will be found under



A, Forcing Out Bushing; B, Driving Out Rivets.

the queries heading in the April 25 issue of the Journal.)

After the valve has been fitted or found to be tight and the cork float put back, it may be necessary to bend the float arm so as to keep the fuel level at the proper level, which, in the float chamber is $\frac{1}{8}$ inch below the nozzle of the needle valve. By bending the float arm very slightly up or down, the height of the fuel level can be controlled. Experiment and patience are required for this adjustment. When adjusted the gasoline level will be below the needle valve opening, so that no fuel will enter the mixing chamber. The mixing chamber is the chamber that is exposed upon the removal of the needle valve housing at the top of the carburetor.

STEERING GEAR ADJUSTMENT.

(H. A. B., Schenectady, N. Y.)

I am having some trouble with the steering gear on my Chevrolet 4-90 car. There seems to be considerable back lash or play in the wheel and the road shocks seem to be carried to it. How can this be remedied?

Your car, 4-90, is fitted with a gear and sector type of steering column in which there should be more or less play, because of the number of gears. If you will examine the steering gearset carefully, you will find that in the gearset there is a sector gear which is fastened to the steering post; this post extends from the gearset to the steering post lever beneath the radiator. Both the steering post lever and the sector gear are fastened to this post by a bolt, which extends partially through the post. As there may be a great deal of wear at this point as soon as the bolt becomes loosened, you

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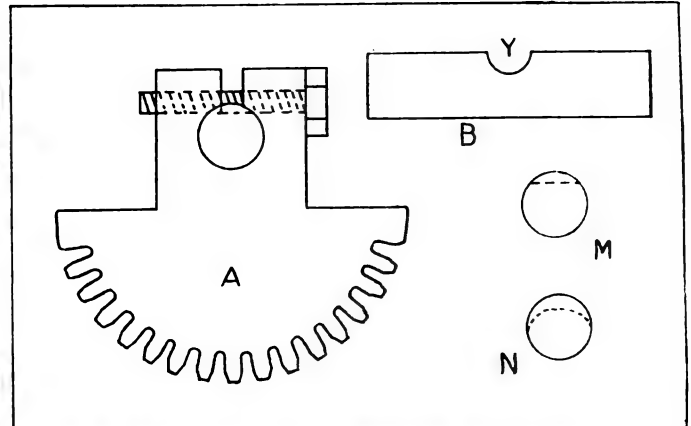
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Illustrating Method Used in Fastening Gear Sector to Steering Post on Chevrolet 4-90.



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will find that the bolt does not fit or that the post has worn to a great extent.

By referring to the sketch you will see just what we mean. Sketch A shows how the gear sector is fastened to the steering post by the bolt X. Sketch B shows the shaft with the "cut away" for the bolt. This same method of fastening is adopted at the other end where the steering post lever is fastened to the steering post.

If you find that after the bolt X is tightened as far as possible there is still play between the shaft and the sector gear, and between the shaft and the steering post lever, it is an indication that the groove Y, instead of being straight across the shaft as is shown at M, has been worn somewhat into the form shown at N.

If this wear is excessive it will be necessary to replace the post, in fact, it is the only safe means of accomplishing the end. Though the drilling of the hole through which the bolt X fits and putting in a larger bolt is often done in this car, it is not to be recommended, as such a procedure materially weakens the parts involved, resulting in injury or death to those in the car when this part falls.

SULPHATION IN STORAGE BATTERY.

(F. E., Middlesex, N. Y.)

Will you please tell me if there is any way to make sulphated negative plates fit for service after they have been exposed to the air for a time? Is there any way of making positive plates from sheet lead? Why is a carburetor mounted closer to one cylinder than the other in a double opposed engine? Would it be better to connect the carburetor with the middle of the intake pipe? When cleaning carbon with oxygen does the tip direct the oxygen to all parts of the cylinder, or does it spread around after it enters the combustion chamber? What method can be used to keep the flame from hitting the spark plug threads?

Whether negative plates of a storage battery may be made fit for service after sulphating depends upon the extent of the sulphation. For ordinary sulphation a recharge of the battery is usually sufficient if continued long enough. When the sulphation has progressed so far as to clog the pores and cover the surface of the plate rejuvenation is accomplished by charging the battery, removing the negative elements and placing them in a bath of sulphuric acid as cold as possible and having a density of 1.240. They are connected as anodes (positive), or in a reverse manner to that in which they are normally connected. As cathodes (negative), "dummy" plates of plain sheet lead about 1/16 inch thick are used. On passing current through the plates the sponge lead is converted into lead peroxide. When the active material is completely peroxidized, the current is again reversed, the acid in the bath first being removed and fresh acid substituted in order that the impurities may not be redeposited on the negative plates. When the elements are finally converted back into sponge lead and reassembled with the positives the capacity and activity of the battery are increased. If the sulphating action has gone so far as to form a layer between the grid

and the active material the plates are usually not reduceable, and must be renewed and replaced by others.

There is no practical way of making positive plates from sheet lead. The making of storage battery plates requires machinery, experience and skill, and even if plates could be made by one the cost would be considerably greater than those made by the factory.

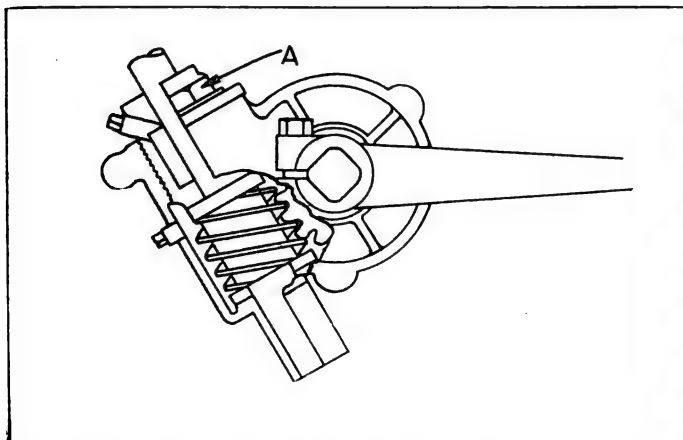
The carburetor connection and its location on a double opposed engine is merely a matter of convenience and accessibility and under ordinary conditions and present construction the gas mixture is not affected by this construction. The location of the carburetor in the middle of the intake pipe, or half way between the cylinders, would not make any material difference.

When cleaning carbon from an engine cylinder by the oxygen method, the oxygen is carried into the cylinder by a flexible copper tube, which should be moved around the cylinder in all directions. This tube prevents the oxygen from touching the spark plug threads. Though the action is somewhat different the flame resulting from the burning of carbon in the oxygen from the tip is practically the same, and is the same distance from the tip as is the flame from an acetylene headlight burner, or the flame from an illuminating gas jet. The oxygen gas itself does not burn, however. The burning is the result of the rapid oxidization of the oil from the carbon deposit. As this proceeds the oil is entirely oxidized and the carbon peels off the cylinder and piston and is blown out from the chamber. If you have never used the oxygen method of carbon burning the best proposition for you will be to get an old cylinder and make a number of trials. Be sure that you fully understand the action of oxygen and the effects. Do you know that steel or iron will burn freely in oxygen? It is a school experiment to fill a bottle with oxygen, put some sulphur on a steel wire, ignite it and dip it into the bottle and the wire will burn brilliantly. Such might be the effect of oxygen in the cylinders of the engine if the oxygen pressure were too great. Before beginning the operation the piston in the cylinder upon which the work is to be done should be at the top of its stroke. Do not concentrate the jet too long in one place. Be sure that the water jackets are filled with water. Avoid overheating the block.

MORE STEERING GEAR TROUBLE. (W. A., Chicago, Ill.)

I have a Regal 4-32 car, fitted with a worm and worm wheel type of steering gear. There seems to be quite a little play in the steering wheel, which I think is located in the worm and wheel housing. Is this adjusted by the nut on the top of this housing?

The lost motion you complain of is probably caused by the fact that the adjustment nut A, as shown in the accompanying sketch, does not fit tight enough upon the top thrust bearing of the worm. To adjust this it is only necessary to unscrew the lock nut and turn the nut A to the right until the play is taken up. Do not turn this nut so far as to cause a bind. The steering wheel should turn freely and without friction or lost motion.



Sketch of Worm and Worm Wheel Steering Device.

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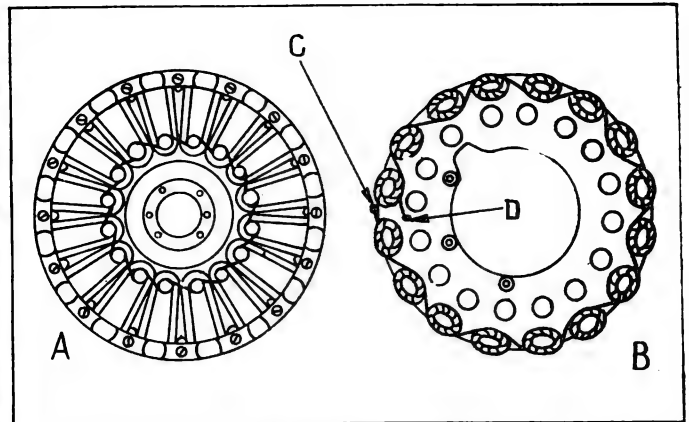
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THE FORD MAGNETO.

(R. J., Fall River, Mass.)

Will you please tell me how the Ford car magneto is made? What voltage it gives and whether it is a high or low-tension magneto?

The magneto of the Ford car is made in two parts: A, the revolving part, which consists of 16 permanent steel magnets attached to the flywheel and rotates $1/32$ of an inch from the stationary part; B, which consists of 16 electro-magnet spools. The spools are wound with copper ribbon and thoroughly insulated from the iron cores by windings of insulating tape. One end of the ribbon is grounded to the coil support as shown at D, the other end connected with an insulated contact point C upon which the magneto contact brush rests in the assembled machine. As the flywheel revolves the magnetic lines of force surrounding the 16 horseshoe magnets are cut by the coils around the stationary magnets, thus a current is set up in the coils and passes out either at the contact brush or at the ground to the ignition coils or lights when the circuit is closed. This current has a potential of about 18 volts when the engine is turning at normal revolutions per minute, is alternating and so-called low tension.

SIMMS MAGNETO ADJUSTMENT.

(C. V., Chester, Mass.)

Will you please give me the proper adjustment for the platinum points in the Simms magneto breaker box? Should the points separate the same on both sides? There is a gauge with the magneto and when the points separate that thickness on one side of breaker they do not separate the same on the other side.

The platinum points should be set so as to open on each cam about $1/64$ inch, or the thickness of a business card. These points should be kept clean and free from oil, and make flush or flat contact with one another. If the points are separated on one side of the revolution more than on the other, it is an indication that the contact breaker cam ring is worn. If this is the case it will be necessary to obtain a new cam ring before proper adjustment is possible. Whether it is possible to get the cam ring separately or with the timing lever depends entirely upon the type of magneto you have.

FUEL SUPPLY TROUBLE.

(C. H. B., Brooklyn, N. Y.)

A short time ago my Inter-State T1917 car began to give me some trouble. It did not run smoothly, but with a jerky motion. A repair man suggested grinding in the valves, which I did. For about 100 miles the car ran well, but then the trouble returned. Ignition system is all right. The car will run for a short distance, but then begin to skip. Do you think there is a possibility of a slipping clutch? Do you think it is in the fuel supply?

Your trouble is probably in the fuel system at some point between the tank and the explosion chamber. In the first place adjust all of the push rods so that there is about .006 inch, or the thickness of an ordinary sheet of letter paper



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between them and the rocker arm when the valve tappet has reached its lowest position. This adjustment had best be made after the engine has run for a short time and is warmed up. Now carefully go over all of the piping and joints between the tank and the carburetor. Drain out the base of the carburetor and note whether the flow of gasoline is constant. It often happens that a piece of waste, packing or dirt lodges in the feed pipe in such a manner as to form a sort of valve action, thereby cutting off the flow. By opening the carburetor or drain cock such a condition may be noted very easily. See that the tank is properly vented, that is, that there is a hole in the top (usually in the filler cap) so that air can enter as the gasoline is drawn off. If the trouble still exists make a careful examination of the carburetor. See that it is properly adjusted and if so, if the trouble still remains, disassemble the carburetor and clean it out.

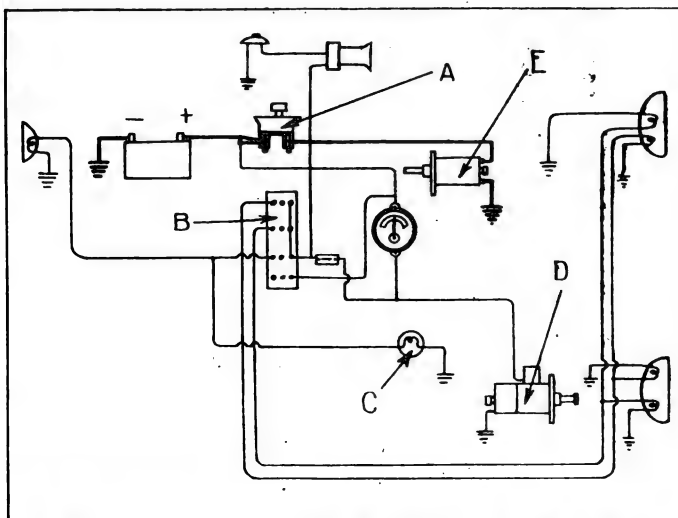
The Schebler Model R carburetor is adjusted as follows: With the engine running, retard the spark and throttle. Turn the auxiliary air valve (this is the large adjusting nut) to the right as far down as possible, then back, or to the left, 1½ turns. Now turn the high speed adjustment (this is located directly beneath the auxiliary air valve adjusting nut) to the right or as far up as same will go. Now turn the auxiliary air adjustment either to the right, or left (it is generally found necessary to turn same to the left) until the engine fires perfectly on all cylinders. This will give the correct low throttle adjustment. Leaving the spark retarded turn the high speed adjustment to the left, or down, by half turns. After each half turn quickly accelerate the engine and note whether same back fires. Continue turning down the high speed adjustment by half turns until the engine does back fire on quick acceleration, then turn to the right, or up, until the back firing stops under the same conditions. Now advance the spark half way on sector and note whether the engine back fires on acceleration. If not, carburetor adjustment is properly set and there should be very few occasions to make any changes on same.

WIRING OF THE ELCAR.

(R. M., Detroit, Ill.)

I have been doing some work on my Elcar touring car model D, and have disconnected a number of the wires. I put tags on all of the terminals, but some of the tags got pulled off so that I cannot seem to replace the wires so that the lights or ammeter work properly. Will you tell me how to connect them again?


Herewith is given a wiring diagram of all the proper connections and wires for your car. You, no doubt, will be able to make the connections by noting the colors in the brand covering of the wires and, by following this diagram, connect the wires properly.



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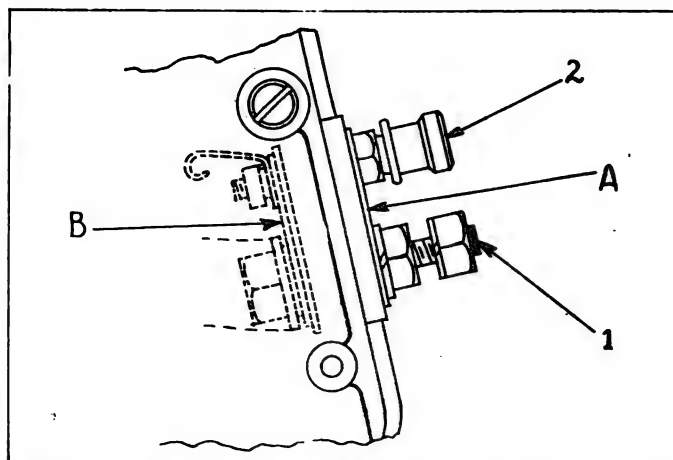
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BUICK AMMETER CONNECTION.

(H. R. M., Rochester, N. Y.)

I have a Buick car, Model B 24, which is not equipped with an ammeter for indicating the charge and discharge of the battery. Will you please tell me where in the circuit I can install an ammeter for that purpose?

Without making a change in the generator, it will be impossible for you to connect an ammeter with this type of machine. On the side of the generator you will find two binding posts, which are connected by a brass strap. This strap must be cut or removed. On some of these machines this strap is also on the inside of the frame, as shown at B in the illustration, in which case it is necessary to remove the motor-generator from the car and disassemble it in order to cut the strap. After the strap is cut a tap is made on the wire from number two terminal to the positive side of the ammeter, and a wire run from the other terminal of the ammeter to number one terminal. The meter for this purpose should be of the centre zero type, reading at least 10 amperes discharge, and 30 amperes charge. No change of wiring is necessary. Before removing motor-generator be sure to mark all connecting wires in such a manner as to make it possible to properly reconnect them.

REPAIRING MAXWELL-BRISCOE CAR.

(W. V. G., Cleveland, O.)

Due to the breakage of some of the gears in the transmission gearset of my Maxwell-Briscoe model Q1911, the case has been broken, and there is a hole in it about three by two inches. The welding expert says that welding would be impractical. Do you think that it could be patched and soldered with aluminum solder? Would it be practical to replace the engine with that of a Ford?

As the Maxwell-Briscoe car is model Q1911, it would not be practical to put in a Ford engine. It would, perhaps, be better to buy a second-hand Ford car, as the cost would probably not be much greater than the cost of an engine. Such a Ford-Maxwell combination would necessitate quite a material alteration in design. Practically the only "worth-while" part of the Maxwell car left after the change would be the chassis and rear axle.

As to the repair on the Maxwell transmission case, we would suggest that you correspond with standards parts makers who furnish practically all supply parts for the old Maxwell-Briscoe cars and would probably be in a position to either repair or replace the casing at a low cost.

It might be possible to patch the hole with a copper riveted patch and aluminum solder. The cost of the experiment (for it would be an experiment), would be small. You might be able to do it yourself with a blow torch or soldering iron. Aluminum solder is obtainable at practically all supply houses.

After having thoroughly tinned the patch and the case at the point in question, rivet it into place firmly and then supply the soldering compound. It must be realized of course that the success of the soldering operation depends upon the absence of all oil and grease from the parts. This is very essential in the case of aluminum.




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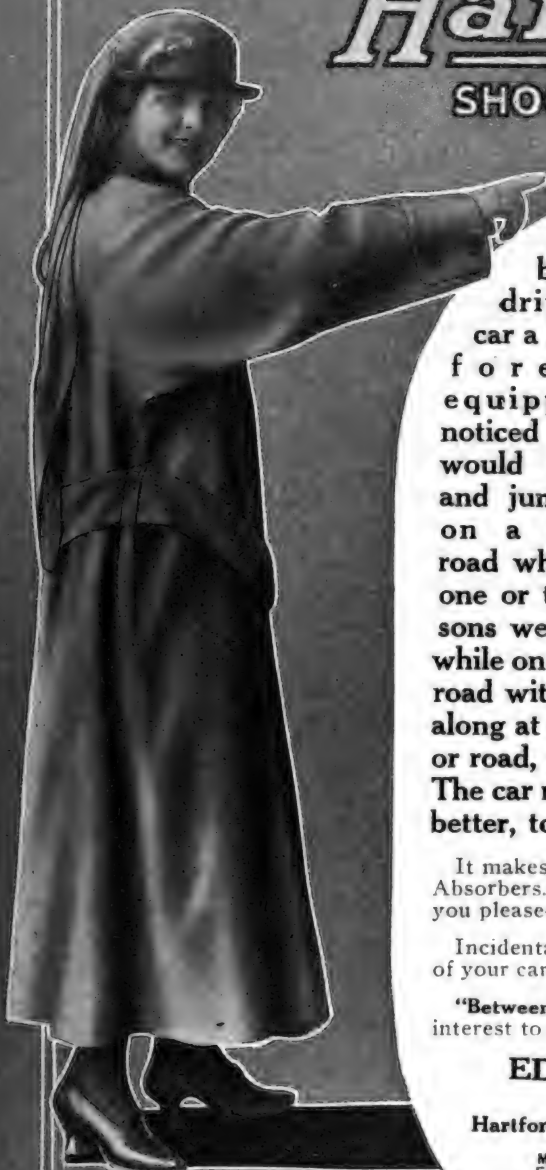
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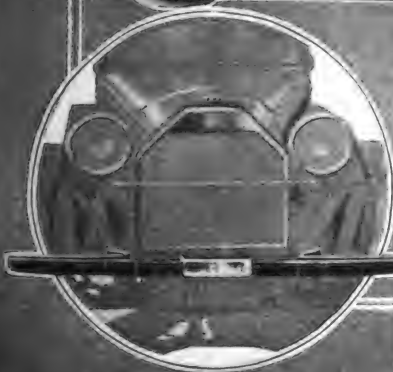
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INDEX TO ADVERTISERS



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AUTOMOBILE JOURNAL

Remittances:
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Entered as second class matter, April 15, 1906, at the Postoffice at Pawtucket, R. I., under act of Congress of March 3, 1879.

Ten Cents a Copy

WELL BALANCED, replete with road information, maps and itineraries, the next issue of the Automobile Journal will be the 11th Annual Touring Number. The editors have been at work for several weeks in the preparation of the data, which is national in scope, for this forthcoming, valuable publication. Scenic routes, military roads and roads of historic interest, East, West, North and South, are to be treated with the view to making them of the most value in an informative and useful way to the traveler by motor car. The edition will be fully illustrated, a guide and hand book indispensable to the tourist bent on seeing America with a certainty of always knowing where one is going and what there is to see. The articles of this issue cover transcontinental routes, as well as shorter tours in all the widely known scenic sections.

PARAMOUNT with the automobile industry and the people at this time is the progress of the war, registration for military duty, the outcome of war revenue tax proposals and all current events of a national bearing. They effect every individual who loves his country. The laying of just taxes to carry out the war for liberty and democracy is expected to be accomplished with wisdom and dispatch. In this issue, too, space is given to information as to the Liberty Loan. Every motorist who is interested, and all, it would seem should be, would do well to investigate this opportunity to help win the war in a substantial and highly necessary way.

THE second problem propounded in the Idea Exchange calls for practical views in selections from used cars. The numerous responses to the first problem assure much interest in this feature.

VOL. XLIII. MAY 25, 1917. NO. 8.

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Treasurer . . . WILLIAM H. BLACK
 Secretary . . . D. O. BLACK, JR.

Published the 10th and 25th of each month by the

AUTOMOBILE JOURNAL PUB. CO.
 Times Building, Pawtucket, R. I.

THIS will be a good year for the building of a garage, despite the fact that many tender enterprises suffered setbacks when the declaration of war was made in April. There are many sound, economic reasons for continuing with building enterprises. The less stoppage there is allowed to come into business the more effective will be the economic strength of the nation for the great struggle on which it has entered, while the progress, comfort, safety and general welfare of every person will be just as much assured for the future as it is absolutely sound and unhurt in the present. In helping along with the garage building idea, this magazine is presenting another design in this issue prepared by the Architectural Department of the Automobile Journal Publishing Co.

ALWAYS of exceptional merit, the character of the illustrations appearing from time to time in this magazine, are up to the latest in design, texture and finish. Several special charcoal sketches reproduced in the first article in this issue are no exception to the aforestated fact.

IN THE section devoted to the National Automobile Association appears a notable address by President Davis, as well as reports for members. The former tells how good roads can be secured for the South and West. The National Highways Association also calls on members and friends to rally to the support of their national good roads plan because of their great importance as a military asset.

SUBSCRIBERS, in giving notice of a change, should always give the old as well as the new address to guard against interruption in the receipt of magazines.

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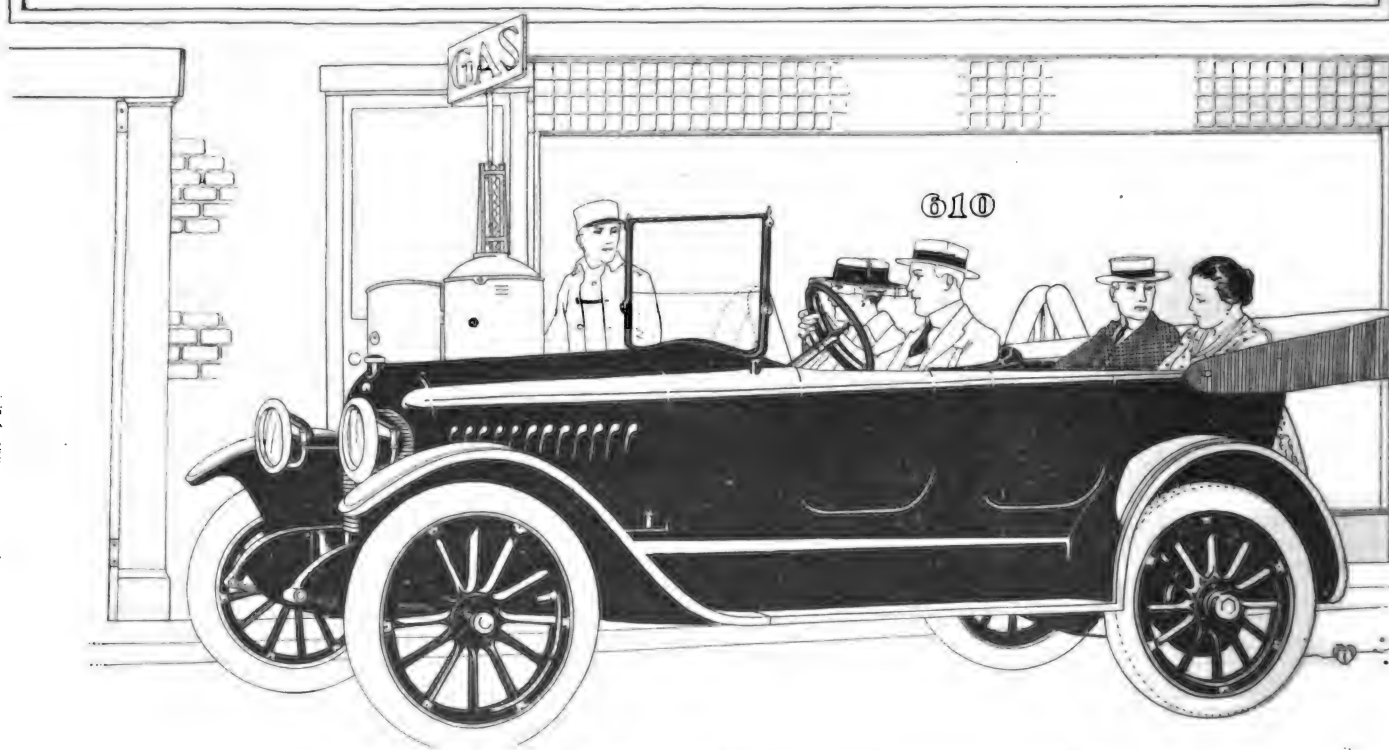
The GRANT SIX owner averages 20 miles to a gallon of gasoline and 900 miles to a gallon of oil. No other car is so economical to operate.

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THE Automobile Journal

XLIII.

MAY 25, 1917.

NO. 8.

Safety—The Spirit of Caution—First

Risks Taken Daily by Heedless Pedestrians and Hazards by Careless Drivers Cause Enlargement of the Constructive Program of Precautions Adopted by the Motorist to Benefit All

A NNUALLY, when the motorist unlimbers his car for the Summer season, safety suggestions come trooping out also with the general hope of reducing distressing accidents. Various commentators have said that traffic collisions and numerous other daily accidents on the thoroughfares do not happen—they are caused; carelessness on the part of some one is at the bottom of them all. Whether the fault is with the man in the car or the man in the street often remains for a jury to determine. Each year brings out hundreds of thousands of more cars and finds traffic on the roads congested to a greater degree than ever before, thus multiplying the possibilities of accidents and calling for the exercise of more discretion and thought in operating a car.

When the call of the road comes to the motorist he carefully grooms his car, inspecting and testing the mechanism so that he will feel assured that everything is in shipshape, but too often is not sufficiently heedful of the fact that for the past several years upwards of 5000 people each year have lost their lives directly or indirectly as the result of motor car accidents, the majority of which were caused by careless driving. While being forewarned is being forearmed, yet it seems the rapid increase in car accidents has little or no effect on chronic speedsters sufficient to keep them within the speed regulations and prevent them from taking all kinds of hazardous chances. It seems entirely reasonable to expect that if the present rate of accidents is maintained, and legislators keep on piling up more drastic (and often ineffectual and discriminatory) laws upon the statute books, the time might come when the driving privilege would be generally restricted.

Why a person should get any particular pleasure from flirting with injury by speeding is a mystery. Analyzing this peculiar phase of the motorist's mind, it becomes apparent that the confusion existing there is largely a combination of thoughtlessness and an overestimation of skill and human powers. Constantly escaping injury at each chance that he takes, the subject becomes bolder, increases the hazards and

is very much surprised when he does come to grief. Drivers never should forget the old adage about the pitcher going to the well once too often. Logically considered, the factors of pleasure are all in the favor of sane driving; the driver who is exercising the utmost caution at all times is the one who experiences the most real, solid comfort from his drive.

On the other hand, it is an inherent trait in the American race to go the limit in all directions, a fact which makes the remedy very difficult to prescribe, consequently those that

have given the problem great thought would place the burden of correcting the evil upon the shoulders of the drivers themselves and in adopting the slogan, "safety first," an attempt was made to make each one conscious of his share in bringing about such a condition.

Hardly had the motor car reached the stage where it would run a distance of one city block before the speed mania cropped out and men began to see how fast they could make it whirl around an oval track. However, the same thing has been true with all methods of mechanical transportation; they are no more than out of the chrysalis than the genius that creates them turns his mind to annihilating all speed records. When the passing generation traveled 10 or 15 miles an hour behind old dobbin, the exhilaration of speed was thought to have reached its maximum state, but now nothing short of 30 miles an hour is traveling at all, and a few are already going over 100 miles an hour in their aeroplanes.

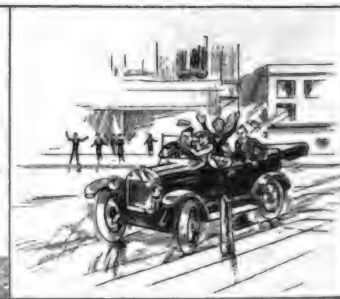
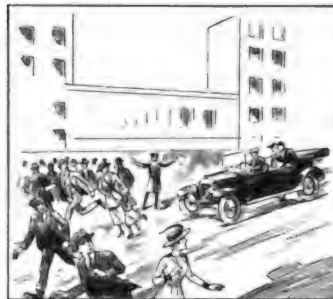
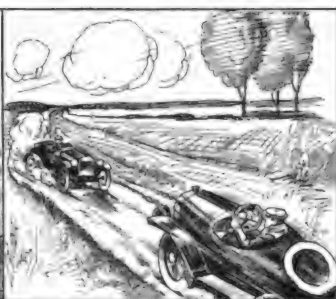
Every driver almost is semi-conscious at least of the fact that speed means danger in any event, whether on

good roads or bad, straight or crooked highways, but as he progresses his thoughts become far removed from impending danger and he may readily exceed the realm of reasonable driving conditions.

Great caution in city driving is imperative on account of the heedlessness of pedestrians who stalk about, their thoughts engrossed with business cares or something else that takes their minds from the possible dangers in crossing thoroughfares where the traffic is very dense. On stormy days



Dashing Through Safety Gates at Railroad Crossings an All Too Common Risk Taken by Too Many Motorists.



Danger Lurks at Corners and in Disputes Over Right of Way.

in the large cities accidents in the traffic are quite numerous, due to the careless habit of the pedestrians in crossing the streets at any place where it seems convenient, not bothering to walk as far as a crosswalk, where they will be protected by the traffic policemen and at a point where the drivers of vehicles will be anticipating their movements. Furthermore, when crossing, instead of being alert for the traffic many continue perusing their papers, or hold their umbrellas crushed down over their hats, shutting out all view of either the up or down town traffic. Others ramble across the streets at any juncture, continuing an earnest conversation with a companion, all absorbed in their talk, and unconscious of the stream of traffic and the danger of the position in which they have placed themselves. Such people make the task of the driver a hard one, but, nevertheless, he must constantly keep them and their actions in mind, as, no matter upon whom the coroner places the blame, irreparable damage has probably been done, if he is unfortunate enough to run anyone down, whether temporary injury or death results.

Children Play Anywhere.

Children in the city and suburbs are the most important factors of all to be considered, as those who frequent the streets as a playground are of an age in which it is impossible to inspire a spirit of caution. They are care free and roam about, entirely unconscious of danger from any source and for that reason it is necessary for the motorist to take it upon himself to exercise extraordinary caution whenever driving through residential districts, or where there is a school house, as he can never foretell at what moment a child will run from behind some fence and out into the street in the path of his car.

One of the very common causes of accidents with children in the street results from their delight in hanging on to the tailboards of passing vehicles, whether motor trucks or horse drawn. If the vehicles are proceeding at a sufficiently slow speed to permit the children to fasten themselves onto the back, they do so, and sometimes several are found hanging on the tailboard of the same vehicle. The driver of the pleasure car following through the same street with these vehicles, anticipates that the children might at any moment release their hold and dart for either side of the highway, for which reason he sounds his horn to warn the children of his approach. This sometimes has the desired effect, but quite often has the effect of distracting and scaring the youngsters, who all drop off together and dash in all directions—quite frequently straight in front of the oncoming vehicle. As the driver has approached close to the heavier car he has little opportunity to stop his machine before bowling over one of the children.

In most cities it is recognized that warnings to the children of these dangers is a waste of breath, so again the motorist is called upon to watch for their presence in the streets and to use particular judgment in operating

A Dash Into the Crowd and a Skid on a Wet Pavement.

in the section. Most of the large cities have placed placards in the streets, indicating neighborhoods where large schools are located and the crossings that are most generally used by the children in going to and from their homes, while several municipalities have traffic policemen placed at the crossings during the hours that the children use them.

Many Traffic Expedients.

The officials in charge of traffic have adopted every conceivable expedient to lessen the number of accidents that it seems would be possible to devise by human resources, but are now inclined to the conclusion that any permanent remedy must come from educating the driver careless in managing his car and also careless as to its mechanical conditions, failing frequently to keep the brakes in proper order and not using chains when weather conditions make such use almost imperative. They do not, however, absolve from blame the unlucky pedestrian who unwittingly gets in the way of the tons of moving steel, wood, rubber and human freight that hits him with dire consequences, as he often is entirely to blame for stepping in front of the rapidly moving vehicles at a time and point when it is too late for the driver to bring his car to a sudden stop.

Assuming, however, that all the pedestrians were impeccable so far as the causes of these accidents are concerned and that every machine was in proper mechanical order and was also fitted with chains when weather conditions warranted it, there still is the factor of careless driving, which is undoubtedly an evil to be eradicated or ameliorated.

Iowa Pursues Careless Drivers.

Suppositionary premises, however, do not offer a very satisfactory basis from which to work to arrive at any accurate conclusion, but from figures tabulated in Iowa by the State Highway Commission, strong evidence is forthcoming of the fact that bad driving is largely responsible for the majority of automobile accidents. These statistics, which were published in the Iowa State Highway Commission service



A Brush on the Road Has Its Liabilities for Disaster to Innocents Unsuspecting of Danger.

bulletin, offer a fair criterion upon which to base conclusions, as that state has more automobiles per capita than any other in the United States and a fairly good percentage of improved roads. Some very interesting facts can be gleaned from these statistics, although it is admitted that they are necessarily incomplete, having been compiled entirely from newspaper clippings.

Of the highway fatalities in that state during 1916, totaling 199, 146 occurred on the highways and 53 at the railroad crossings. Analysing further, it is found that about an equal number of these resulted from cars turning turtle and being struck by trains, there being 45 fatalities resulting from the latter and 42 from the former causes. Twenty-five fatalities resulted from machines going over embankments or into ditches or ravines. Of these three causes speeding or racing accounted for six cases, while several hit the curves at too fast a pace to negotiate them. Thirty-one were killed by being either struck or run over by automobiles or motorcycles, while the remaining causes were miscellaneous, including collisions, of which there were only a few between automobiles and several with motorcycles and bicycles. A number were found beneath wrecked machines, in which cases the causes of the accidents could not be fully ascertained.

Campaign Against Reckless Ones.

In an accompanying table is shown the automobile accidents in the State of Iowa, where no fatalities occurred. Commenting on these statistics the report says: "Too great speed for the condition of the road and the traffic on it is responsible for the great majority of accidents. A few accidents result from car breakage and considerably larger number from inexperienced drivers. The great majority are due to absolute recklessness. It is questionable whether legislation of any kind prescribing a limit of speed would be effective in reducing the number of reckless drivers. Cancellation of right to drive a car would, if enforced, bring results. The only way to effectively curb the speed evil would be to forbid the sale of high speed cars, for there are reckless and careless drivers who will continue to have accidents as long as they are allowed to run cars on the highways."

It is easy enough to shuffle the responsibility for all these accidents onto the drivers' shoulders, but can it be proved



Preoccupied Business Men Will Invariably Read Papers, or Hide Themselves Under Umbrellas on Rainy Days When Crossing Busy Streets.

that he or she is the guilty party. No doubt the blame can be placed, although again the question of the party's responsibility must be taken into consideration. They are not accountable under the law, really, if they erred in the operation of the car through impaired eyesight or for psychological reasons. In this connection the citation of some very interesting statistics gathered by the Southern Pacific Railroad will shed much light on the working of a driver's brain when he approaches a danger zone, what effect it has upon his actions and substantiates in large measure the charge that a large proportion of operators of automobiles are almost criminally careless.

Warnings That Are Disregarded.

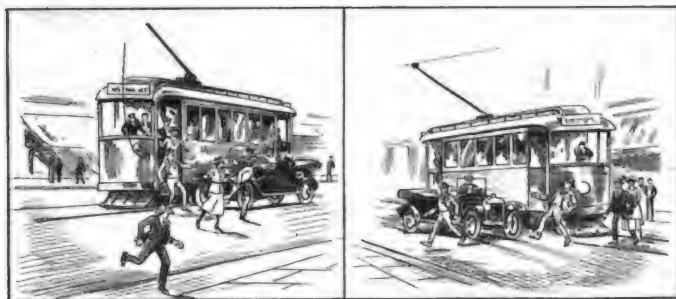
These figures showed that 525 drivers smashed through the gates when they were down at the crossings and the bells were ringing a warning. In all 20,000 cars were observed, and the drivers of 69½ per cent. of this number looked neither to the left or right. Two and seven-tenths per cent. took pains to look both ways. Twenty-seven and eight-tenths per cent. looked one way along the track only and 19¼ per cent., or 3301 drivers, drove over the tracks at a reckless speed. Of the total 20,000 drivers only 35 observed the real precaution of stopping their cars to ascertain if the way was clear before proceeding over the tracks.

In the face of these figures—making due allowance for that frequent bias which tends to place the burden of blame on the injured—an overwhelming number of drivers stand convicted of recklessness and thoughtlessness. Of course, as everyone knows who has driven a high powered car, there is great fascination in "hitting it up," and every chance taken adds zest to the pleasure and increases the exhilaration of the sport, just as some Americans who have hazarded their lives in all kinds of sports, and, no longer finding them entertaining have taken to driving aeroplanes for the French government at a speed of 125 to 150 miles an hour, incidentally amusing themselves by firing machine guns at contemporary German fliers and taking their return fire. So it goes; much of the recklessness is of this sort.

These are the drivers that should be restrained; these men with an irresistible desire to annihilate space who are not only detrimental to the welfare of the motor car industry,



Children May Always Be Relied Upon to Do the Unexpected, Dropping in Fright from the Tailboards of Trucks and Rushing into Harm's Way.



Passing Street Cars Furnishes a Multitude of Thrills and Some Knockdowns.

themselves, but also dangerous to all the other motorists who use the roads.

There are other drivers who never exceed the speed limit and proceed with great caution, but, nevertheless find themselves in smashups because they are slow witted, and, when confronted with a predicament from which they could easily have extricated themselves with a little presence of mind and action, become stricken into inaction with a paroxysm of fear. In contrast to this kind there is the over-confident chauffeur who prides himself on escaping through the narrowest openings in the traffic at high speed, or passing a machine ahead by gracefully dipping into the roadside ditch and coming up again, luckily in most cases, without decapitating the occupants on the telegraph poles. This same fellow, urged on by the exclamations of wonder expressed by the occupants at his wonderful skill, next shows how to take a right angle curve at 50 miles. He don't always come to grief on these spectacular stunts, but does sooner or later, and those who urged him on or showed so much admiration for his skill, say "I told you he would get it some time."

The True Function of Reserve Power.

Reserve power which is originally placed in a car to enable it to cope with the grades on steep hills and to carry it through adverse road conditions is too often mistaken for a means of developing great speed, and many an average driver does not realize that the requirements of him have greatly changed since he turned the throttle and ran the car up from 25 to 40 miles an hour. At the lower speed his attention need not necessarily be absorbed in guiding his car and watching highway conditions a long way ahead, but at the higher speed his whole thoughts should be taken up with watching road conditions as the increased momentum makes all bumps or ruts, as well as moderate turns in the roads, very dangerous. The distance at which he can come to a stop has also been lessened and in many other respects the nature of the control that he exercises over the car has changed so that emergency actions are far less effective to avert disaster than they would be at the lower speeds.

Proof of this is found in the table showing the record of auto accidents in Iowa, in which no fatalities occurred, it being shown that 963 of a total of 2574 accidents were cases where the machine turned turtle or went over an embankment. A driver seldom finds himself at the foot of an embankment or ravine or beneath an overturned car if he has been driving carefully and at a reasonable rate of speed.

After a machine has been mangled

up against a pole, street car or in a ditch, there is little chance of positively refuting the operator's charge that something in the mechanism went wrong.

It is possible, however, scientists say, that the trouble might have been with the driver and he not be conscious that it was his fault. In explanation of this phenomena they state that there is such a thing as auto hypnosis, under the spell of which the subject becomes unconsciously drowsy and he loses control of the wheel. This hypnosis is induced so the psychologists say by the lulling effect of touring in a car, passing smoothly and quietly through the bracing air and the rhythmic buzz of the motor tends to quiet the nerves and produce somnolence.

Habits for Thinking Safety.

Realizing the fallability of the driver the railroads have in most cases entirely changed their systems of signaling and posting at crossings. Efforts have also been made to inculcate into the minds of the motoring public that whoever directs the car should cultivate the habit of thinking "safety." If this could be accomplished it is believed that accidents would become a rarity instead of so common that they have become appalling in their effect.

Justices who preside in the courts where thousands of cases of violations of traffic and highway laws are tried are mainly of the opinion that the enactment of legislation is not very effective in reducing the number of accidents. Judge Sabbath of Chicago, Ill., who tried over 20,000 cases in the traffic court in that city, says that fines and penalties were the least important part of his work; he states that the man who is fined usually leaves the court defiant; he considers himself square with the law. His penalty is paid and he feels as though he owes nothing more to society. But if he finds a judge who patiently and earnestly points out to him the seriousness of his offense because of the danger to society his better self responds.

Some New Railroad Notices.

Recognizing the failure of motorists to appreciate the great dangers attending the crossing of railroad tracks at the highway level, the New Haven railroad officials have had notices

Careful Driving Movement Initiated In Iowa

1916 HIGHWAY FATALITIES.

(Compilation based entirely upon newspaper clippings.)

Month	Fatalities	On Highways	At Crossings
January	2	1	1
February	4	0	4
March	5	4	1
April	4	4	0
May	15	13	2
June	29	21	8
July	37	21	16
August	35	28	7
September	18	14	4
October	26	22	4
November	8	6	2
December	16	12	4
Totals	199	146	53

AUTO ACCIDENTS WHERE NO FATALITIES OCCURRED.

Record for Seven Months—June-December.

128 Autos over embankments	175 persons with broken bones
250 Autos over embankments	436 persons cut and bruised
107 Autos turned turtle	270 persons with broken bones
478 Autos turned turtle	466 persons cut and bruised
165 Auto collisions	162 persons with broken bones
308 Auto collisions	344 persons cut and bruised
204 Autos collide with buggies	244 persons injured
71 Autos collide with street cars	28 persons injured
105 Autos collide with bicycles	42 persons injured
176 Autos into obstructions in road	288 persons injured
286 People struck by trains	282 persons injured
90 Autos struck by trains	97 persons injured
202 Auto Accidents where auto was wrecked and no one hurt.	

4 Engines through bridge.

Total accidents.....2574

Total number of people hurt.....2834

posted along their roadbed at these points warning the automobilists by calling their attention to the fact that over 2000 persons were killed in 1916 on grade crossings and that the rate of increase of fatalities and accidents on grade crossings is 25 per cent. a year. The notices also state that there were 10 accidents of this kind on the New Haven road during the first two months of this year in which six were killed and 13 injured.

The A. A. A. took up the matter of railroad crossing accidents owing to their great frequency. A number of suggestions were made as to regulations governing the operation of motor cars on highways at these approaches, but little good may come of these unless they are incorporated in a uniform traffic law that becomes effective throughout the country. When it was proposed to consider all drivers irresponsible and compel them to stop at all railroad crossings before proceeding across the tracks, there was a wail of protest and this idea was defeated, as was also the idea that the speed should be limited to 10 miles an hour, it being claimed that such a law would encourage the establishment of speed traps at these points to gather fees and persecute the motorists. After all is said and done it is a problem that is declared by those that have studied it to be one of educating the driver to think, feel, see and act cautiously.

The points of personal precautions have been sent broadcast over and over again. Like the moral law, they need frequent perusal and rehearsal in order that they may become so fixed in the motorist's driving equipment that they become a part and parcel of his being and nature. It would seem almost unnecessary to issue warning repeatedly against passing a street car while passengers are boarding it or being discharged, or the advice not to pass a street car going in the same direction on the left side. It would seem needless to plead with drivers to show courtly consideration for other drivers and for pedestrians to use more care in keeping out of the way of moving vehicles, yet education on these points seems absolutely necessary all the time.

Positive, constructive efforts which are bettering the conditions all the time in circles and communities which do care and strive for betterment, lay stress on simple instructions such as to always drive on the right side of the street and to pass all vehicles except street cars on the left. It is highly important, too, for beginners to attain absolute competency before operating a car on main thoroughfares. To watch speedometers and have them tested frequently is also beneficial in the onward pressing of the spirit of caution, which is itself valuable and beneficial at all times and places.

MOTORCYCLE REGISTRATION.

Registration figures show that 270,500 motorcycles are now in use in the United States. Sixty thousand will be added to this number this year—the largest yearly production the motorcycle manufacturers have ever known.

STATIC ELECTRICITY BUGABOO DISPELLED.

Static electricity, superinduced by the passage of gasoline through chamois skin during the filtering process, was declared about a year ago to be full of great danger. Motorists were advised to discontinue the use of the chamois for fear a conflagration would result from a spark igniting the fumes of the gasoline.

When the idea became prevalent the Franklin Automobile Company of Syracuse, N. Y., determined to make a rigid investigation. Only one case was reported where an explosion of gasoline could be directly traced to such a cause. The con-

clusion drawn was that the chances are not greater than one in a million, if that high. Expert opinion from many sources agrees that there is no need to worry about a condition where there is so little likelihood of static generation of electricity, especially in sections of the country where freezing temperature is seldom known, and where zero weather is never experienced.

WAR TIME DEMAND CANVASS RESULT.

A thorough investigation of the effect of the war on the automobile industry and on business in general has just been concluded by the largest eastern manufacturer with notable results that are of paramount interest to every automobile owner and to every man in business. The field was canvassed by the 23 state managers of the Metz company of Waltham, Mass., and their unanimous report has a most optimistic trend.

The business of dealers in practically every state in the Union was taken into consideration, so that it is not merely a Metz forecast that Manager Roscoe A. Pickens of the company was able to announce from the factory last week. The hysteria of the first week, after the declaration has subsided and the general public is coming to realize that the English slogan of "Business as Usual" is to apply here, as well as in the countries of the other allies. In fact, it will apply in a



No One Would Expect a Driver to Run a Right Angle Curve at Fifty at the Risk of Turning Turtle in a Field or Gully.

greater degree in the United States.

All of the 23 state representatives reported increases in business in their territories, not only over the previous month, but over the same period of last year. They report that there is a greater demand for automobiles than was anticipated.

GARDENS MADE AROUND FIRESTONE FACTORY.

Realizing the importance of President Wilson's appeal for more intensive farming among city folks, H. S. Firestone, president of the Firestone Tire and Rubber Co., Akron, O., ordered 70 acres of land about the Firestone factories plowed up, divided into garden plots and offered to the company's married employees for cultivation. Within 48 hours after the offer was made every plot had been applied for and there was a waiting list. Thus practically every available foot of land about the Firestone factories is under a state of cultivation.

To insure the cultivation of every foot of ground a time clock has been installed within the garden tract and each gardener must register a certain number of hours work each week or forfeit his plot. The company furnishes the seeds and an expert gardener has been employed to instruct the men and insure maximum production. The gardeners choose their crops and land allotted according to adaptability of soil.

Detroit, The Automobile City, Clearing Streets

Metropolis Without a Broadway or a Subway and Buzzing With Motors Changes Parking Practices for Cities

Leaving Machine at the Front Door of Big Office Buildings No Longer Possible in Many Large American Cities



Top, Diagonal Parking, Behind Old Semaphore, Not Permitted Now; Left, Advance Signaling; Centre and Right, Traffic Around Circle System.

THE traffic problem has assumed proportions since the first of the year that seems to have baffled the traffic experts, highway commissioners, city councils and other municipal bodies who are in charge of regulating the operation of automobiles within the city limits. From some points of view it seems impossible of solution owing to the enormously increasing numbers of cars coming into use.

In Chicago and New York the country's two largest cities, officials are at their wits ends to arrive at a satisfactory solution, but are constantly checked and brought up against a stone wall in the course of their investigations by the insurmountable condition of fact that a certain thoroughfare, of a certain width can only accommodate a fixed number of vehicles traveling at a given rate of speed. It will be seen that the only answer or solution of such a predicament would be to increase the speed at which the vehicles were allowed to travel, but as this would greatly increase the hazard of accident, which is also a factor that they are also trying to eliminate, some other provision must be made.

Drastic measures have been adopted which have led unthinking motorists to believe that conditions have resulted from a desire on the part of the police to persecute them. This is a ridiculous viewpoint, as in many cities conditions have come to such a pass that the traffic officials are openly countenancing violations under extenuating circumstances as a means of helping them solve the

problem of traffic. In the matter of parking machines alone the big cities have been obliged to adopt rules that practically keep all the cars from without the business sections except when moving, or allow them to stand but a brief period in the restricted territories.

Detroit, the automobile city of the world, naturally has a large per capita number of motorists and the city officials, of course, have gone to every extreme and adopted every expedient to formulate a set of traffic regulations that will expedite traffic in a satisfactory manner for all, yet the constantly increasing number of machines on the streets has sorely taxed the resources of their police department.

A comprehensive city ordinance has been adopted which is frequently amended whenever occasion arises to correct the regulations for motor traffic. This has been printed in pamphlet form and distributed among the car owners and drivers. As the officials realize the futility of enforcing ideal regulations without the co-operation of the owners and drivers, a special plea is made to them to be considerate of the rights of others and to make every effort to make the streets safer, which example will be followed by others.

To illustrate the necessity of such an attitude on the part of the operators, one of Aesop's fables about the two goats which met on a log is printed in the pamphlet. This fable was to the effect that there was not room for the goats to pass when they met on the log, and as

neither would give away to permit the other to pass, they met head-on with a terrific impact and both fell into the water beneath and suffered death as the result of their obstinacy.

The "right of way" is illustrated with a diagram and explained as follows: "The right of way means that if two cars arrive at a street intersection simultaneously, driver of the one on the right of way street has the right of way, otherwise he has no greater rights than the driver of a vehicle on a street that is not designated as a right of way street. This is assuming that the drivers are keeping within the speed limit and have cars under proper control at street crossings."

The Detroit traffic ordinance while similar in many respects to those in other large cities, has many features not found in regulations elsewhere, particularly those relating to parking and impounding cars and the severe penalties for violations of the ordinance. A digest of the ordinance brings out the following salient features:

Lights are required on all vehicles from one hour after sunset to one hour before sunrise, whether the cars are standing or moving. Automobiles must have at least two headlights in front, visible, when lighted, at not less than 200 feet ahead; one red light on rear, visible not less than 200 feet to the rear, with a white light shining on the license tag. Glaring headlights are not permitted on any street or avenue in the city.

All motor vehicles must be provided

with adequate brakes and suitable bells or horns, but exhaust whistles are prohibited except for use by the police and fire departments. Open exhausts or other noises and the emitting of smoke, steam or noxious gas or vapor, or the loading of material in a way that will cause unnecessary noise is prohibited. Muffler cut out controls are not to be located where they can be operated from the driver's seat.

Speed shall be governed by conditions and may be deemed reckless even though within the limit allowed by law. Two vehicles moving abreast shall not be overtaken and passed.

The general rule shall be that where streets intersect the one north and south shall have the right of way, but autos must be under proper control.

Driving a car while intoxicated shall be construed as reckless driving and is punishable under the penalty for such offense.

Drivers following street cars shall bring their machines to a stop when the street cars they are following stop to take on or let off passengers.

This provision does not apply at street intersections where traffic officers are stationed, the officers to direct the action of the drivers.

Drivers are not allowed within safety zones that are occupied or about to be occupied by any person. Turns should be made as close to the right hand curb as possible and beyond the centre of the intersection of the two streets.

Speed is limited to 10 miles per hour in business districts and 15 miles in other sections of the city. At street crossings the speed should be cut down to one half the prescribed speed limit.

Cars must not be parked within 15 feet of fire hydrants or cisterns and must not be allowed to stand more than 60 minutes between the hours of 8 a. m. and 6 p. m. in congested business districts of the city. Motor must be stopped, or, on electric machines, controller switch locked and key withdrawn, when cars are left standing. Stops must not be made on cross walks so as to obstruct free passage to them and backing to the curb is not permitted except when actually loading or unloading.

The penalty for violating any of these sections of the ordinance ranges from a jail sentence of 30 to 90 days and a fine up to \$300, or both.

All vehicles while standing or parked shall be parallel to the curb throughout the entire city. Neither right wheel shall be farther than six inches from the curb. Over three feet of space must be left between parked vehicles. No parking of vehicles is allowed on streets occupied by car lines within 70 feet of the intersecting crosswalk at all regular designated car stops.

No double row parking is permitted on the same side of any street. The police commissioner, however, at his own discretion may require other methods of parking than the prescribed parallel. Certain streets are designated where parking is permitted and whether or not it is permitted on one side only.

No parking is permitted in front of the

entrance of any theatre, church, office building, public dance hall, club or other building in which a large number of people are accustomed to gather except to take on or leave passengers or merchandise at that place.

For the violations of any of these requirements the police department is empowered to take the "offending car" to the pound, which is located at Cadillac square, and the owner will be compelled to pay a fee of \$3 for the return of his car to his possession.

Every operator of a pleasure car in the city must have the same provided with a good and sufficient lock to be installed in a manner that will allow the towing or moving of the car when necessary by the police or fire departments. It is also required that the operator securely lock the car when parking in such a manner as to prevent the starting and operation of the car by an unauthorized person, provided that the car is not left in charge of a person of suitable age.

As parting advice to the unthinking motorist, the pamphlet on the rear cover warns against excessive noise making in the following attractive appeal: "Honk, Honk, Honk, Consider the sick persons and others whose rest means their ex-

istence and don't Over-Honk."

The motorist in Detroit has little excuse for violating this ordinance, as through the liberal use of signs all the special zones are designated; directions of turning are indicated; parking places marked and prohibited passages roped off. The traffic officers at the intersections of the streets are furnished with revolving signs on standards conspicuously elevated above the traffic to check and start its flow at different intervals.

CHICAGO USED CAR SHOW BIG SUCCESS.

The Great Central Market Used Automobile Show, held at the Coliseum, in Chicago, under the auspices of the Chicago Automobile Trade Association, from May 5 to 13 inclusive, was pronounced a big success by those dealers who participated. A total of \$275,825 worth of cars were sold as a result of the exhibition. Of the total, or 379 cars, 216 were sold from the Coliseum floor for \$170,161; 113 used cars were sold from the sales rooms for \$62,883, and 40 new cars were sold at the sales rooms for \$42,781.40. This business was aside from the truck and accessory business that also resulted directly from the show according to the reports from the exhibitors.

The total attendance in the nine days of the show was 27,151, of which number 17,785 were admitted free, and 7366 paid admissions. Total receipts were \$12,948.58, and expenses \$8,503.45, leaving a profit of \$4,445.13. The average price received for the used cars sold at the Coliseum was \$787.75, while the average price of the used cars sold from salesrooms was \$556.48.

GREAT BRITAIN ADOPTS FORD'S NEW TRACTOR.

The British government has officially adopted Henry Ford's new farm tractor and has already made arrangements for its manufacture by many of the machinery companies in England. Working models and all the necessary plans and information for the construction of the tractors was sent to England by special steamer.

The Liberty Loan is entitled to a front seat in every car.

The army of progress moves on a good motor.



Angle Parking Obstructs View.



Circle System Standards.



Safety Zone at the Right, Where There is No Parking Allowed.



New Signal Set "Stop."

New Signal Set "Go."

S. A. E. Will Discuss War-Planes

War Department Head to Address the Summer Meeting—Papers of a Practical Type

AT THE May meeting of the Council of the Society of Automotive Engineers, held at the Washington headquarters in the Munsey building, plans for the summer meeting were completed.

Secretary of war, Newton Baker, has accepted an invitation to be present and address the engineers at the informal dinner which will be held in the banquet hall of the New Willard Hotel, Tuesday evening, June 26, the second day of the meeting of the members and guests.

The dinner will be the greatest get-together of the government officials and S. A. E. members in the history of the society. Over 30 guests, representing the Army and Navy from Washington will be present, and in addition the Council of National Defense and other organizations co-operating with the government at the present time are expected to be present at the sessions.

On Tuesday, June 26, the professional session will be held, at which papers will be presented of a practical type, and on subjects of interest to the members who are now working with the government.

Wing Commander I. W. Seddon, R. N. A. S., who is a member of the British commission in this country, and who is demonstrating some of the British types of war airplanes here, has agreed to present a paper dealing with the practical aspects of airplane manufacture. Major Rees, also of the British commission, an experienced British aviator throughout the entire Somme campaign, will answer questions on this subject.

W. Owen Thomas, consulting engineer of Detroit, will handle the matter of motor trucks in the European war. He has been head of military motor transport work for the Canadian government under Major-General Sam Hughes, former minister of militia for Canada. Mr. Thomas was on the French and British front for 14 months.

A practical paper on farm tractors will be presented by H. L. Horning of the Waukesha Motor Company. He has been co-operating with the Department of Agriculture demonstrating how the tractors in present use are averaging 48 days per year work, which is only one-third of their capacity. Plans are under way to show how farm tractors can be of great assistance to the government in solving the present food problem.

Henry R. Stuphen, vice president of the Elco Company, will represent the motor boat activities of the S. A. E., giving an illustrated talk on standardization methods and production plans used in building the 500 submarine chasers, which the country supplied to the British government. He will show three reels of moving picture films, covering the complete scope of the work.

The professional session will be held at the Bureau of Standards, as will also the Monday meeting of the Standards Committee, and an inspection of the various departments of the bureau has been arranged for beginning at 3 o'clock. It is also possible that special demonstrations of materials and of other work of the bureau will be arranged for at the time of this visitation.

Over 800 members of the society are expected to be present at the meeting and dinner.

GEAR MANUFACTURERS' ASSOCIATION MEETS.

The American Gear Manufacturers' Association held its first convention at the Hotel Schenley, Pittsburg, Penn., on May 14 and 15.

The convention was opened by F. W. Sinram, president, with an executive session. In the afternoon of the first day S. L. Nicholson, sales manager of the Westinghouse Electric and Manufactur-

ing Co., spoke on "The Ins and Outs of an Industrial Organization," and James E. Gleason presented a paper on "The Spiral or Curved Tooth Bevel Gear." On the morning of the second day the following papers were presented: "Job Gearing—To What Extent Can It Be Standardized," by Frank Burgess; "Advantages of Gear Standardization," by Wm. Ganschow. In the afternoon George L. Markland discussed the "Difficulties of Gear Standardization."

ANNUAL MEETING OF ELECTRIC ASSOCIATION.

The Automotive Electric Association held its first annual meeting at the Homestead Hotel, Hot Springs, Va., on May 17, 18 and 19. Members were present representing the following companies: Dayton Engineering Laboratories Co., Dayton, O.; Dyneto Electric Corporation, Syracuse, N. Y.; Electric Auto Lite Co., Toledo, O.; the Leece-Neville Co., Cleveland, O.; North East Electric Co., Rochester, N. Y.; Remy Electric Co., Anderson, Ind.; the Robbins & Myers Co., Springfield, O.; Splittorf Electric Co., Newark, N. J.; U. S. Light and Heat Co., Niagara Falls, N. Y.; Wagner Electric and Manufacturing Co., St. Louis, Mo.; Westinghouse Electric and Manufacturing Co., Pittsburg, Penn.

In his report appointing various sub-committees, the chairman of the standardization committee said that in view of the immediate prospect of the member companies being called upon to supply electrical equipment to the government for use on trucks and aeroplanes, an especially strong sub-committee had been appointed to consider questions pertaining to this work and to make such recommendations as may seem advisable from the standpoint giving the government the best and most prompt service possible.

The legal and patent committee reported upon efforts made to arrange some manner in which the patent situation could be amicably adjusted. It was stated that a preliminary investigation shows prospect of serious and extensive litigation involving many companies.



Group of Members of the Automotive Electric Association, Holding the First Annual Meeting of the Society at Hot Springs, W. Va., May 17, 18 and 19—Discussions on the Patent Situation, Equipment for Trucks and Aeroplanes Predominated.

\$3.30 A DAY SPENDING MONEY

Colorado Touring Expenditures Comprise a Considerable Resource to Scenic State

It is often asserted that motorists spend considerable money in the states through which they tour and that the financial return to a state from this source includes a large sum from residents of other states.

The State Highway Commissioner of Colorado decided to find out, if possible, how much truth there was in this frequently made claim. So he distributed in Denver, Colorado Springs and Pueblo a circular letter of inquiry regarding the expense of touring to residents of other states, the length of their stay in Colorado, and similar facts. He obtained replies from 76 tourists from other states, which showed that each car carried four persons, as a rule, the average expenditure was \$3.30 per person per day and the average stay in the state was 28.6 days.

The records of travel counts and other estimates of foreign cars indicate that during 1916 about 26,500 cars of non-residents passed through Colorado, and the State Highway Commissioner estimates, on the basis of the replies to his inquiries, that as a result of this touring by non-residents, about \$10,000,000 was brought into and spent in the state. Touring is made easy by 19 camping sites in Colorado cities or towns and by the camping facilities afforded under reasonable restrictions by the officers in charge of the National Forest Reserves.

MAY INCREASE PRICE OF THE FORD AUTOMOBILE.

Dealers in Ford cars have been notified of the possibilities of an increased price to become effective in the near future owing to the advanced prices of raw materials.

It is understood that unfilled orders now on the books, amounting to over \$100,000 will be filled at the old prices, but that new orders will be taken subject to advanced prices.

The freight car shortage has made deliveries of Fords in the East and South difficult, with the result that in some localities the second hand cars that have been used but a few months are selling at list prices and premiums have been offered dealers in some cases to obtain new ones.

AUTOMOBILE CLUB OF MARYLAND OPENS HOUSE.

The Automobile Club of Maryland opened its new club house in Baltimore on May 9. Governor Harrington of Maryland, A. G. Batchelder, chairman of the executive board of the American Automobile Association, and other prominent men were present and participated in the

ceremonies that marked the occasion.

The club house, one of the finest in the country occupied by an automobile club, cost \$100,000. It is located at Mount Royal avenue and Cathedral street, in Baltimore. The offices are located on the second floor, together with a "self service" bureau, where a motorist can seek out for himself almost any kind of information of interest to the tourist. A

revolving stand contains maps of almost every state in the Union. A large assembly room with stage at one end is located on the third floor.

COMMERCE COMMISSION GRANTS RATE INCREASE.

The Interstate Commerce Commission has tentatively granted the railroads the 15 per cent. increase in rates, to become effective, unless recalled, on June 1. The increases from Detroit, Cleveland, Indianapolis and other big automobile centres to eastern and southern points vary from \$9.23 to \$22.71 per car, while from those points to Pacific coast points the increase amounts to \$46.50 per car. The average advance is about \$18 per car.

INDIVIDUAL LIGHTING PLANTS

Description of the Gray Motor in a Ready-to-Use Installation

Garages located along country roads, as well as others in communities more accessible to electric lighting circuits, will be specially interested in the New GraElectric lighting plants made by the Gray Motor Company of 435 Oakland avenue, Detroit, Mich. Wherever the cost of electric installation is heavy or the price of current prohibitive, there is a call for individual lighting plants. Not only is the system to be considered on account of its convenience and low cost, but also because of its adaptability, in that the power plant may be used for other work than that of lighting without detracting from the efficiency or operation of the lighting plant.

This system consists of three units, the power plant, the generator and the storage battery. The power plant is a single cylinder, water cooled gasoline engine of the horizontal type, equipped with jump spark ignition, an automatic governor, sight feed oiler, muffler and drive pulley from which may be driven, by belt, small machinery of many kinds.

The flywheel is belted to the generator, which furnishes 30 volts and has a capacity of from 40 to 60 lights according to size. Both the power plant and generator are mounted on a heavy steel sub-base, so that no aligning of the parts is necessary when installing the plant, nor is a concrete foundation required. Mounted on the same base is the switchboard upon which are volt and ammeters with fuses, switches and controlling devices.

The third unit is the storage battery, which is kept charged from the generator and from which is taken the lighting current and current for ignition. This unit also supplies current for starting the engine when the starting switch on the switchboard is thrown in.

With this system the current may be taken from the batteries alone, running the engine only when it is necessary to recharge them from the generator; from the batteries while the engine is running, and from the generator alone with the batteries floating on the line.



GraElectric Lighting Plant, Showing Dynamo and Generator Compactly Lined up on One Base, on Which Also the Switchboard is Mounted.

What Milady Motorist Will Wear

By Mrs. A. Sherman Hitchcock

NOT so very long since the motor woman's costume was mannish and severe; entirely devoid of fancy touches, but now that motor cars are accepted as among the utilitarian things of life, and motoring is as often a matter of convenience and pleasure as of sport, ideals respecting motoring raiment are vastly changed. To be sure, there are certain rules dictated by the laws of good taste. The motor woman does not wear for a limousine what she would for the open car. She does not wear the same style of motor clothing on a calling or shopping trip as she would for a run out to the Country Club or on a long tour. But nowadays even the costume for touring is not so severe as formerly. It must under all circumstances be serviceable, ship-shape and comfortable, but a certain note of piquancy has crept into it as well.

At this season of the year all women are much interested in suitable materials for both coat and frock and there is a splendid choice to be found in the shops.

Points in Selection.

In selecting materials for motor garments, durability as well as attractiveness must be considered if satisfactory results are to be had. The manufacturers have brought forth the finest materials combining these two essentials and the motorist cannot go wrong who makes her selection from among them. For the big, sumptuous, smart, snugly and delightfully comfortable motor coat there is nothing that can excel the Worumbo coatings. Combining warmth without weight, they are just the ideal garment for the many cool days and evenings through the summer and come in all the newest and most attractive colors. The Bokara, Nanken, Poilu, Hilendale, Tussok, Velour and Kashmir are particularly appropriate for the motor coat. For the light weight cover all coat of the summer and for the frock, nothing can be more serviceable or attractive than the St. Nicholas cloth, the Golden Glow, Silverbloom, serge, jersey cloth, Khaki Kool, Yo San and the lovely Sportoplin and Sportussah.

Very smart motor coats, untrimmed, are made of velour. They are ample in form, with generous collars and cuffs. Beige is one of the most fashionable shades and is especially so when combined with the blues, but we are seeing so much of it that it is quite apt to become rather tiresome before the season is over. Italian green, Phlox, old blue, lime and the browns are excellent colors. A coat of beige gabardine, collared and lined with silk cashmere in a pattern of red, mustard and black and built quite

loose without girdle of any kind was shown me by one of the best designers. Another was of apple green jersey cloth, which hung straight from the shoulder, but had a girdle which tied in front and was finished with two large silk tassels. The buttons were of polished green leather.

Fluttering capes have always been disliked for motoring, but there are many capes this season which are finding high favor with motor women—garments which are half coat, half cape, loose, all-enveloping and easily slipped over any costume. Jersey cloth makes a most desirable cape on account of its extreme light weight and its warmth. Poilu Operafluf and Hilendale are splendid ma-

gives the woman a decidedly smart appearance at the Inn or Country Club where she goes to dine. The Sportoplin and Sportussah are decidedly in public favor for these frocks.

There are many new designs and colorings in these materials, some of the loveliest of which introduce yellows; and by the way yellow, orange and the other similar shades are quite the most popular of the season. Sportoplin comes in all the plain shades, as well as those having the large sports figures in a combination of colors. Sportussah is in plain shades, among which some of the most attractive are Tennis, Lime, Spring, Vestal, Mist, Yacht, Empire and Tea Rose.

The majority of these frocks are made very simple and very straight and what they lack in elaboration they have in smartness. They quite often show touches of hand embroidery and oftentimes a narrow string belt, which ties in front in a seemingly careless bow. A delightful frock of old blue Sportussah is ornamented with hand embroidery in blue, orange and metal thread, and has large swinging tassels of silver and blue at each end of a four-cornered tunic. Another in Sunset shade has a split apron tunic, hardly to be distinguished from a long version of its smart relative, the chemise blouse. Yellow silk embroidery, yellow silk tassels and white collar and cuffs of organdy make a desirable combination.

Special Motor Hats.

Motor hats are of every known and imaginable material this season, trimmings are conspicuous by their presence and crowns are high. An excellent model for the motor woman, in Milan hemp and taffeta, is particularly adapted for long distance touring and combines smartness with comfort and durability. Another model here-with illustrated is also of Milan and has a crown trimming of wide moire ribbon.

There are some delightful close fitting hats of straw in the sports shades and entirely covered by veils of a differing tone which are intended for the long tours. The veils are shirred or draped around the front of the hats and can be brought forward or left to hang at the back as the wearer may prefer. It is only for touring that the long and thick veil is now used.

The proper motoring veil is of fillet, French lustre and other attractive mesh, with figures and designs, and many have a border of handsome pattern. Draped on the motor hat a veil of this character gives the necessary protection.



A Georgette Model of Peacock Blue and Gold Yo San Silk. Imported by J. M. Giddings & Co., New York City.

terials for the motor cape.

Popularity of One-Piece Frock.

The one-piece frock has become one of the most necessary garments in the motor woman's wardrobe. One of the best materials for this use is Silverbloom, which possesses a durability unequaled by any other material. It is easily adapted to the straight silhouette which Paris is so inclined to favor and a wisely chosen collar may be of white pique. Silverbloom is very attractive when ornamented with soutache braiding and many original effects may be obtained which render a frock most lovely. There is a great demand among motor women for the frock of soft silk. It does not crush or muss when worn beneath the coat and



Models Shown Here

Nothing more exclusive or up to the minute in smart motor dress can be found than this green and white Fairway checked poplin and cape of green jersey, shown above at the left. The sailor hat of the latest shape boasts a green bow, which makes it indispensable with the costume.

In the centre, the coat of Worumbo kashmir—the coat and fabric that will be in great favor this season for motor, beach and a multitude of uses. Note her shoes. This is a cloth top shoe season.

At the right, this smart model of wool velour is one of the best styles of the season. This coat combines warmth without weight. Courtesy Franklin Simon & Co., New York City.

Below at the right, a wonderfully appropriate hat for motoring; is wind resisting and close fitting. Made in Milan hemp braid and taffeta silk, in any color or combination of colors. Courtesy Youman, New York City.

This new veil, at the left, is called the Shetland Scroll. Note the very becoming effect, also the smart motor hat with its crown trimming of moire ribbon. Courtesy Jennings Lace Works, Brooklyn, N. Y.



PLATE THREE

GARAGE WITH CHAUFFEUR'S QUARTERS

Semi-Fireproof One-Story Structure of Hollow Tile and Stucco
With Appointments for the Housing of Two Cars*Design by Architectural Department of the Automobile Journal Publishing Company*

The accompanying plan, the third in the series on garage designs presented through the Architectural Department of the Automobile Journal Publishing Co., shows a private housing of exceptional appointments, provided with room and facilities for taking in and caring for two cars.

THIS is a garage provided with chauffeur's living quarters, making it ideal for physicians, or other professional men or persons, who may have occasion to call upon the services of their car at any hour of the day or night. Together with the completeness of equipment, it is also made possible to a large extent to have a great deal of the mechanical work and attention required by a car, thus called upon for fulsome service, done by its regular caretaker within the garage. How far this may be carried depends, of course, upon the judgments that always surround the circumstances in every case.

To build this garage so that it is comparatively fireproof, and at a cost of about \$2100, is a matter capable of being adjusted between the builders' art and the market cost of materials, in almost any locality with ease and dispatch.

It is remarkable that in a one-story design the compactness of arrangement permits so large returns in advantages and conveniences. In general construction the walls are built of hollow brick tile, faced with stucco, and the inside of the structure, including the ceiling, is stuccoed with cement in a manner similar to the outside.

A steel gasoline tank is buried outside the building line of the garage, and a supply pipe is led from the tank to a measuring pump in the garage, thus minimizing the danger from fire and explosion. A small door provided in the rear saves opening the heavy front doors when it is not desired to take out the car. As the upper panels of the main doors are generously glazed, a well lighted interior is assured at all times and the arrangements of ingress and egress in ordinary are well taken care of.

As will be seen from the plan of the front elevation, it is a structure that would greatly enhance the value of any estate, and would be fitting in appearance to go with a very costly residence. As it is constructed of hollow brick tile, with a stucco exterior, it is subject to varied color treatment. To harmonize with adjoining buildings or the walls it can be surfaced in keeping with the ideas of the owner. A substantial con-

crete floor, faced with one inch of cement, a shingled hip roof, completes the description of the main structural details.

The main opening in the front, 16 feet, eight inches wide, is closed by two doors of the sliding type. Much economy of space is accomplished by the fact that both are sliding doors, one passing behind the other. Concrete wheel guards at either side of the opening protect the door jambs.

A brick chimney, with metal flashing, is faced with stucco and lined with terra cotta. The roof is framed of 2x6 inch rafters, 20 inches on centres, and the rafters are covered with boarding and shingles.

With electric lighting, a hot water heating system which runs from an independent boiler room, toilet and bed room, the garage is suitable for all the requirements of the man who hires a man to drive and do all the maintenance and repair work on his car, as the appointments are such that the question of keeping the man constantly about the place will lose most of its usually unfavorable aspects.

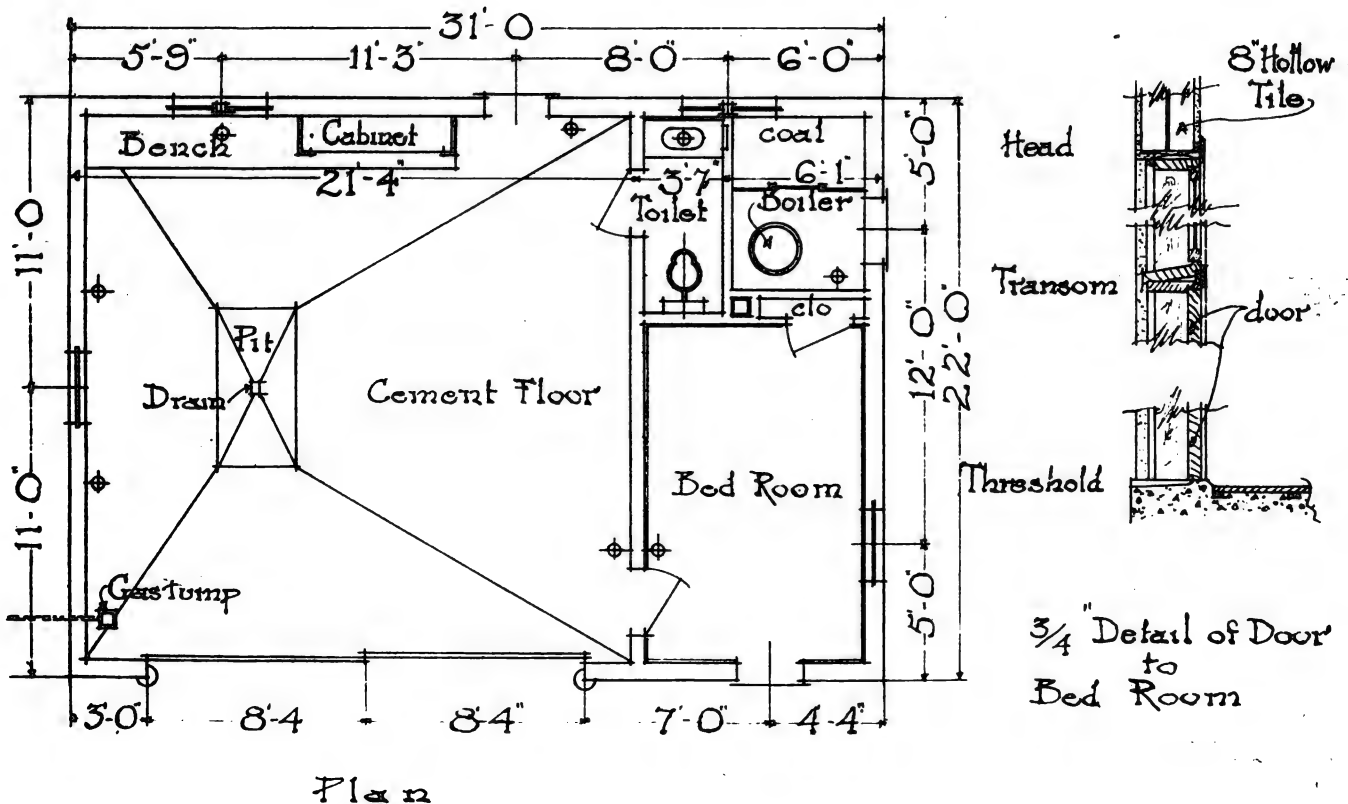
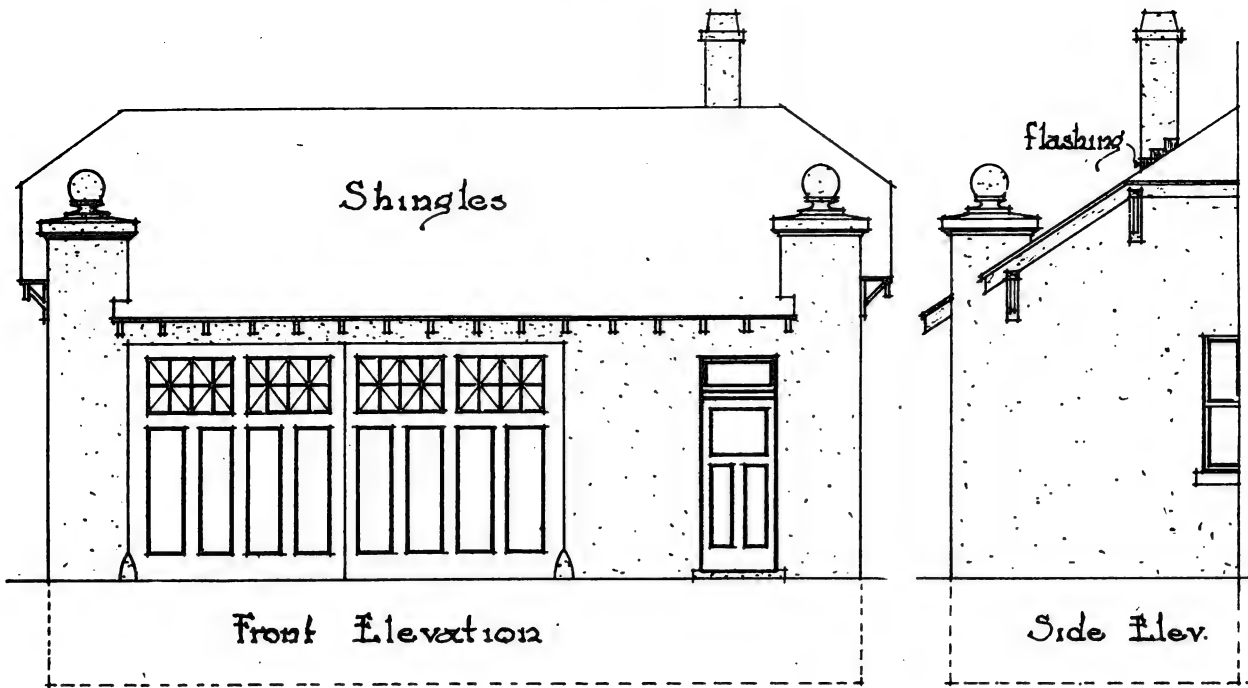
The bed room, located at the right, in the front end of the building, is 8x13 feet. One window opens on the side and entrance is gained through a separate door in front and one leading from the room into the garage. A commodious closet is provided in the rear. A wooden floor is laid over the concrete in the chauffeur's room.

The space immediately back of the bed room is used for the heating equipment and lavatory, the two being separated by a brick wall and the former separated from the remainder of the building by walls on both sides. A door leads into the boiler room from the outside. It is 6¾ feet long by five feet in width. At one end there is a spacious coal bin.

Entrance to the lavatory is through a door from the garage proper.

A work bench, cabinet, pit in floor, gas pump and overhead washing apparatus completes the general equipment. Both the floor and the pit are slightly dished to the drain outlet in the centre of the pit. The pit is 3x6 feet and four feet deep, thus allowing plenty of space to give easy access to the under body of the car, permitting work to be done on it with facility and not in a cramped position, making it also not difficult to enter or leave the pit while the car is over it.

PLATE 3



Supreme Motors Corp. Will Build Four, Six and 12-Cylinder Engines

New \$1,000,000 Organization Formed at Cleveland Will Make Multi-Cylinder Type for Pleasure Cars.

The Supreme Motors Corporation has been formed at Cleveland, O., with \$1,000,000 capital to engage in manufacture of gasoline motors. Three types of engines will be made, a four-cylinder, six-cylinder and 12-cylinder respectively. The two smaller types are designed for truck and tractor work, while the multi-cylinder type is for pleasure cars.

The Davies-Mitchell Engineering Co. of Cleveland, which carried on the experimental work in connection with developing the engines, has been absorbed by the Supreme Corporation. Officers of the company are: President and general manager, C. F. Jamison, formerly with the Saxon and Elgin companies; vice president and treasurer, Charles H. Davies; vice president and director of manufacturing, B. J. Cline; secretary, William J. Lavery; director engineering and purchasing, C. N. Mitchell; assistant chief engineer, C. E. Manning. Mr. Manning for the past three years was with the Continental Motor Co.

GULF REFINING CO. ISSUES TOURING MAPS.

The Gulf Refining Co., Pittsburg, Penn., has issued through its Touring Bureau, touring maps of New England, New York, New Jersey, Southern States, Middle West States, Pennsylvania, Texas and Transcontinental, showing all trails.

These maps, which are corrected to date, show all the motor routes in the territories covered and are a valuable aid to the motorists who are touring through those sections.

Copies may be secured from any of the Gulf Refining dealers who display the sign of the orange disc, or will be mailed upon request to the Gulf Refining Co., Frick Building Annex, Pittsburg, Penn. Requests for touring information will also be furnished by the company's Touring Bureau.

NEW MARMON AGENCY IN NEW YORK CITY.

The Marmon Motor Car Co. of New York has been formed to handle the Marmon agency in that territory and will continue to occupy the salesrooms of the branch at Broadway and 62nd street.

T. B. Van Alstyne is president of the new company. The other officers are: Secretary, F. G. Carrie, former manager of the Marmon branch; treasurer, Charles Larson, the present agent of the Oldsmobile in New York.

ALLOYS OF CHROMIUM, COPPER AND NICKEL.

The University of Illinois Engineering Experiment Station has just completed

a preliminary systematic study of the alloys of chromium, copper and nickel and their properties. The work has been under the direction of Dr. D. F. McFarland, assistant professor of applied chemistry, and Dr. O. E. Harder, fellow of chemistry.

Copies of Bulletin No. 93 containing the results of these tests may be obtained without charge by writing C. R. Richards, director of the Engineering Experiment Station, Urbana, Ill.

SAMUEL L. SMITH DIES IN DETROIT.

Samuel L. Smith, the founder of the motor car industry in Detroit, and a silent financier in the promotion of automobile manufacturing, died at his home in that city on May 7 in his 87th year.

Although his name was seldom connected with the phenomenal growth of the automobile industry in the vast amount of publicity that has accompanied that growth, he was one of the most active factors in the establishment of the business. His faith in the future of the business, backed up by his heavy investments, intrenched the business on a solid foundation and did much to perpetuate it through the trying times that manufacturers experienced during the early days of motor car manufacturing.

He established the Oldsmobile company in Detroit 16 years ago and was the first man who recognized the future possibilities of the new mode in transportation, placing the production of his plant on a big scale and producing thousands of automobiles annually. His enterprise and courage shown in his convictions inspired many men in his organization that have since become leaders in the great automobile industry, including R. E. Olds, founder of the Reo Motor Car Co.; J. D. Maxwell, founder of the Maxwell Motor Car Co.; William F. Metzger, one of the original incorporators of the E-M-F company, which was later taken over by the Studebaker Corporation; Roy Chapin, Howard E. Coffin and R. B. Jackson, founders of the Hudson Motor Car Co. and the Chalmers Motor Car Co.; C. D. Hastings and R. C. Hupp, founders of the Hupmobile Co.; James F. Bourquin, prominent in the Paige Motor Car Co. organization; Percy Owne one of the incorporators of the Liberty Motor Car Co.; J. C. Bayerline, identified with the formation of the King Motor Car Co., and W. L. Daly, who is now sales manager of the Columbia Motors Co.

The Dodge Bros. also benefited from Mr. Smith's enterprises, as he placed an order for 2000 transmissions with them when they conducted a little machine shop in the automobile city.

Previous to entering the automobile field Mr. Smith had been engaged in the lumber, mining, railroad and lake shipping business.

TO PLANT POTATOES AT SHEEPSHEAD BAY.

Harry S. Harkness, owner of the Sheepshead Bay Speedway, has announced that the big area inside the two-mile course will be planted to potatoes.

Nearly \$15,000,000 Worth of Orders Greet \$10,000,000 Doble Company

Corporation Just Organized to Manufacture Steam Car Builds Big Sales Organization.

T. P. Myers, vice president and general sales manager of the Doble-Detroit Steam Motors Co., recently incorporated for \$10,000,000 to manufacture the Doble steam car, has built up a sales organization of 1100 dealers throughout the country and 40 or more of this number have already contracted for nearly \$15,000,000 worth of Doble cars for delivery between September and December of the present year.

All offers of contracts from abroad have been deferred until the domestic distributors can be taken care of.

DRUMMER COVERS BIG TERRITORY IN CAR.

B. A. Small, a drummer for a San Francisco house, who covers the big territory south of the Pacific coast metropolis to the Mexican border, decided last summer that he would purchase a motor car. Since that time in a Scripps-Booth roadster he has covered over 22,000 miles making regular trips and is still running on the original set of tires. He has used, according to his record, only 31½ gallons of lubricating oil and has averaged 27 2/3 miles to the gallon of gasoline. His repair bills have been practically nothing.

CHICAGO SPEEDWAY FOR TRAINING DRIVERS.

The Chicago Speedway is rapidly being equipped as a training school for army chauffeurs and aviators. Hangars have been erected on the grounds and two airplanes are in service. Dario Resta has been tendered the position of trainer for drivers and William V. Skall has been appointed chief instructor of the aviation department. After taking a course of 10 preliminary lessons the student may qualify for a pilot's license in the Aero Club of America by making a trip of four continuous hours.

"LEGAL POINTS FOR AUTOMOBILE OWNERS."

A handy little book entitled "Legal Points for Automobile Owners," written by Leslie Childs, has been published by the J. S. Ogilvie Publishing Company, New York. As the title of the book implies, it contains information of value to every automobile owner regarding his legal rights and his liability under various circumstances.

NEW FORD PRODUCTION RECORD.

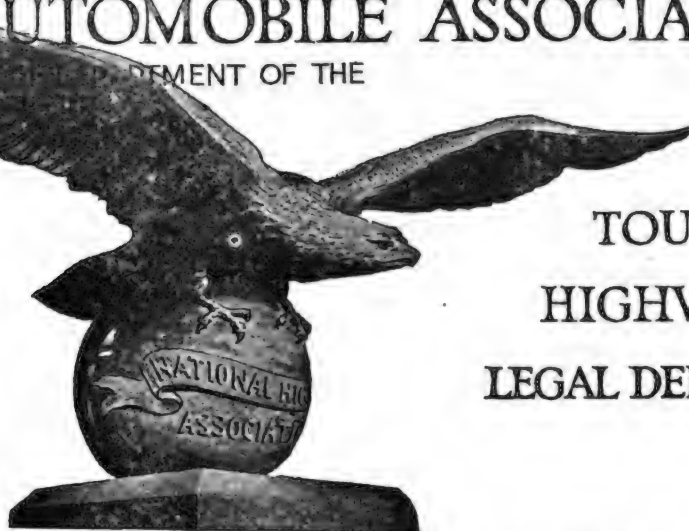
The Ford Motor Company made a new production record on April 26, when 3118 cars were turned out. The month's production for April was 72,444 cars.

OFFICIAL JOURNAL OF THE NATIONAL AUTOMOBILE ASSOCIATION

DEPARTMENT OF THE

NATIONAL
HIGHWAYS
ASSOCIATION

TOURING
HIGHWAY
LEGAL DEPTS.



9 PARK STREET, BOSTON, MASSACHUSETTS

NEW MAINE AND MASSACHUSETTS LAWS

THREE laws which affect, or may affect motorists operating in Massachusetts have just been enacted in the Massachusetts Legislature.

The first provides for inquiry by the Massachusetts Highway Commission of the subject of damages to persons and property by accidents caused by owners and operators of motor vehicles. The commission has been ordered to consider methods of protecting persons against such damage and indemnifying persons so damaged; and the commission has been ordered to submit a report to the next Legislature upon the subject, with drafts of such legislation as it may deem expedient in the premises.

The second, of still greater importance, is the new so-called eight-foot rule, which prohibits motorists from driving automobiles within eight feet of the running board or low step of a street car being used by passengers for embarking or alighting. This law apparently permits a motorist to pass a standing street car, if he can go by it at a distance of eight feet from the running board or step. Inasmuch as many of the streets in Boston are not wide enough to permit the passing of a motor vehicle outside of the eight-foot zone, some test case will doubtless result; and a fair construction of the statute indicates that where a street car has stopped and it is impossible to pass it at a distance of eight feet, the motor vehicle must be brought to a stop eight feet to the rear of the street car. As has been stated, however, this law will not apply where passengers are protected by safety zones, or where a traffic officer is in charge.

Third. Hereafter motorists will not be required to report every accident, however slight, to the Highway Commission, as was formerly the law. Under the new

plan the motorist will have to report only accidents in which a person is killed or receives a substantial injury.

MAINE.

The State of Maine has just passed the following laws affecting motor vehicles and their operators:

1st. No person operating a motor vehicle in the settled parts of cities or towns shall at any time open the muffler cut out, nor permit such motor vehicle to make any unnecessary noise, and any person violating this law shall for each offense be punished by a fine of not more than \$20.

2nd. Whenever any person has once registered a motor vehicle of which he is the owner under the provisions of the laws relating to the registration of motor vehicles, the secretary of state may at his discretion, when it becomes necessary for such a person to have a new registration or to change the old registration of his motor vehicle, to issue to such person a new number, the same as the old number that is being surrendered, or to reissue to such person the old number.

3rd. The State Highway Commission may, upon proper application in writing, grant permits for the operation of jitney buses, so-called, or any other steam or motor driven vehicles, making regular scheduled trips for the carriage of passengers or freight from one point to another and they may also make regulations, which in the opinion of said commission, are necessary for the protection of streets or highways. No jitney bus, or other steam or motor driven vehicle shall be operated on any highway without permits of said commission.

POLICE ACTIVITIES.

ARLINGTON, MASS. This town has

adopted a traffic regulation which provides that an automobile that follows a street car must stop when the car stops and not start until the car starts and that when a street car is standing still no vehicle following it shall pass it on the left and thus run the risk of striking a passenger who is crossing the street in front of the electric car.

NORTHBORO, MASS. The police of this town will at once strictly enforce the motor vehicle laws in order to stop all reckless or unreasonable driving upon the highway.

TRAFFIC REGULATIONS AND POLICE ACTIVITIES.

NEW ROCHELLE, N. Y. The board of Police Commissioners have amended the traffic regulations ordinance so as to forbid all vehicles to be turned around between street intersections on Main street and Huguenot street, to Coligni avenue and all streets running into them. This action is meant to eliminate collisions and other vehicular accidents.

UTICA, N. Y. Traffic ordinance 444 of 1916 is now in full effect and all officers are ordered to see that each provision is strictly enforced. The more important provision of the ordinance prohibiting a speed of more than 15 miles an hour demands extra precautions at intersecting streets; a full stop behind a trolley car taking on or discharging passengers; forbids parking on crosswalks; or within 10 feet of a hydrant and also in front of the entrances of buildings or parking in the congested district longer than necessary to disload or discharge passengers.

LOST—Ford Touring Car, Model 1917. Manufacturer's number 1,720,419. Any information regarding this car will be appreciated by the association.

ROADS FOR NATIONAL DEFENSE

Awakening in Connecticut to the Issue of Good Roads Preparedness

THE following article appeared in "New England Roads," the official organ of the Connecticut Good Roads Association, under the title of "Preparedness—Shall Connecticut Do Its Part?" It is worthy of reprint here.

"Connecticut, one of the great industrial nerve centres upon which the defense of national interests to a large extent depends, knows that immediate preparedness is one of the vital necessities of the present crisis. And preparedness means not only that we must bring our factories and munition plants to their full power of production, but that we must make complete the system of permanent trunk highways by which the mobilization not only of the potential soldiers of the nation, but of the military supplies is made. The speedy completion of the main trunk lines that grid-iron the state is no less an essential element in real national preparedness than is the mobilization of the army, the speeding up of the production of munitions and the building of superdreadnaughts.

Upon an adequate system of national highways, more than upon any other one thing, does the safety of the United States depend in case of invasion by a first class power. The nation with poor roads stands little chance of victory in a clash with that power which has its great centre linked up by a system of permanent highways suitable for the maximum of motor car traffic. So it is that the State of Connecticut can do no great service to the country at this time than to foster and speed up in every way it can the completion of the good roads system, which has already been brought to partial completion in the state. The gaps in the trunk lines need to be filled in with what speed we can accomplish the work. Then, should real trouble come, we shall be assured of a quickly worked out plan of mobilization of men and resources such as is at present impossible.

To those who have given intelligent study to the problem of preparedness, it is vital that the states, which have made a beginning of permanent highway systems, bring them to completion as soon as is humanely possible. Connecticut cannot do better at the present time than to devote a generous part of its appropriations this year and next year to the building up of a great system of good roads that will enable motor cars to traverse the state in all directions and which will make possible the supply of our fighting forces, no matter what may happen to the railroads and trolley lines, which are inadequate at best, to meet the demands of modern war.

We have had a striking example of the value of the improved highway in the

case of France, which, invaded and beaten back by the German hosts, its railroads only half able to meet the demands of the perilous situation, with many of them in enemy hands, found its salvation in the permanent roads and countless motor cars which it had ready for the imperious need. The capture of Paris was prevented by the dauntless bravery of the French army and the strategic genius of her commanders to be sure, but bravery and genius alone could not have prevailed without adequate roads and swarms of motor cars to furnish swift transportation to soldiers and supplies at the vital moments of the battle of the Marne.

Today in France the railroads do their adequate part in the task of supplying

the army at the front, but the greater part of this supply work, upon which victory or defeat depends in each great battle, is undertaken by motor cars. And this colossal work of the motor car is made possible only by the good roads of France and by these alone. The permanent highways that had been created in the years before the war proved to be the greatest asset in her national treasury. Trust France not to forget upon what has depended her salvation through the last two and a half years of grim war. Trust France to see to it that immediately upon the ending of hostilities there will be a replacement upon a gigantic scale of the roads which have suffered during the war and an extension of the good roads system to parts of the country as yet unprovided.

Perhaps the salvation of the United States may at some not distant day depend upon the carrying through of the preparedness that finds its opening in the improvement of our national highways. What is true of Connecticut is equally true of Massachusetts, New York, Pennsylvania and other coast states.

HELP WIN BATTLES ON GOOD ROADS

IN VIEW of the fact that billions of dollars will be spent by the National Government in carrying out the plan for preparedness which Congress has authorized, the National Highways Association, believing that "transportation preparedness is the rock upon which battles are won or lost," is calling upon its 102 departments and divisions, its 113 members of the council of governors, its 139 members of the council of commissioners, its 74 divisions in its council of national advisors and upon its nearly 200,000 members to write to the President of the United States an indorsement of the following communication, in behalf of National Highways and Good Roads Everywhere:

Executive Offices,
"Elmwood," Cambridge, Mass.

To
HON. WOODROW WILSON,
President of these United States,
White House,
Washington, D. C.

The National Highways Association, at this most momentous stage in the history of our dear country, desires to put its great national organization at the disposal of our nation, to the end that our people may gain, in the shortest possible time, an adequate system of national highways, and as an outgrowth thereof good roads everywhere.

Transportation preparedness is the rock upon which battles are won or lost. Troops held for days where they are supposed to be, without support or supplies and food, become mobs—and mobs cannot fight.

"Preparedness" is the watchword of the hour. We are all for it. Some for war! Some for defense!! Some for peace!!! There can be no real preparedness for war, for defense, for peace, without

NATIONAL HIGHWAYS and GOOD
ROADS EVERYWHERE.

We are calling upon our one hundred and two (102) departments and divisions, throughout our nation, to render our government and our people their very best, unswerving work towards this end, for our country;

We are calling upon the one hundred and thirteen (113) members of our council of commissioners, in all the state highway departments of our states, that they may respond with their united strivings towards this end, for our country;

We are calling upon our seventy-four (74) divisions in our council of national advisors, in which sit two hundred and eighty-six (286) "men of recognized ability and eminence in the arts, sciences and letters" throughout our nation, to likewise do their utmost towards this end, for our country;

And finally we are calling upon all our members throughout the Union to give "aid and comfort" to our nation and its people to this end, for our country, that we may have adequate highway transportation over national highways and good roads everywhere.

And we hereby call upon each and every trustee, officer and members of our council of governors, council of commissioners, council of national advisors, national council of presidents, national board of directors and our departments and divisions and their vast national membership, and all of the members of the National Highways Association, to write you, our President, pledging their united, unswerving support to our nation, our people and our government, to the end that we may all have

NATIONAL HIGHWAYS and GOOD
ROADS EVERYWHERE.

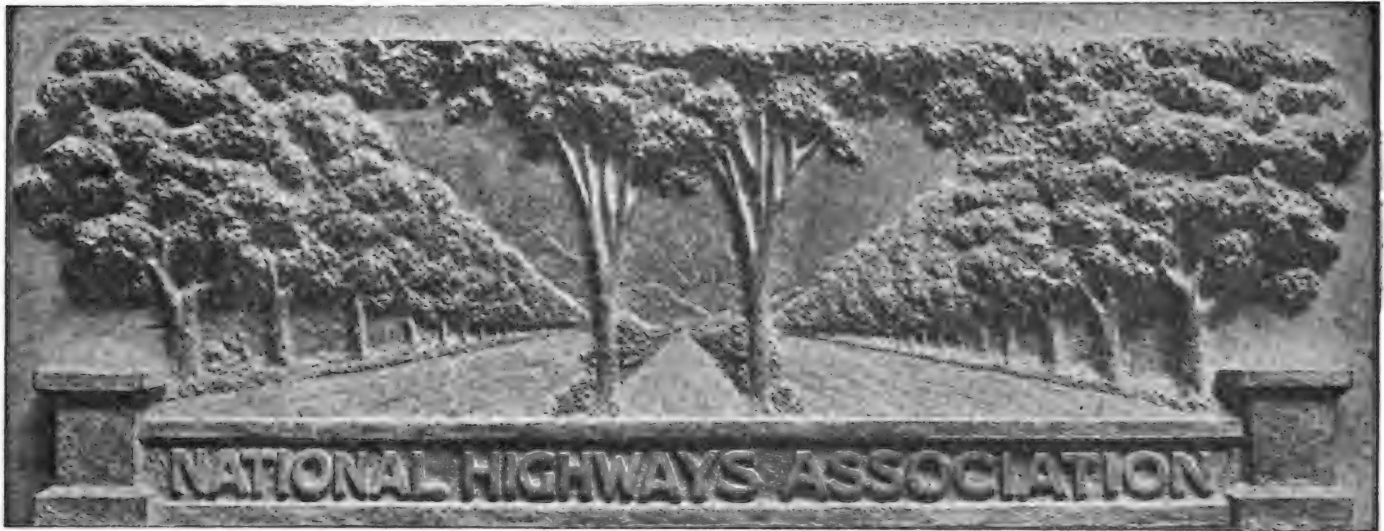
Whether they be for war! for defense!! or for peace!!!

Respectfully,
CHARLES H. DAVIS,
President.

Approved—
Coleman Du Pont,
Chairman Board of National Councillors.

NEBRASKA TAXES IMPROVE ROADS.

Nebraska now has one automobile for every 10 inhabitants and ranks second among all the states in the Union in this respect. The state will benefit to the extent of approximately half a million dollars through the automobile tax and this money will be used for highway improvement.



HOW THE SOUTH AND WEST CAN GET GOOD ROADS

WE ARE here for a great purpose; a "four-fold" purpose. That great purpose of gaining good roads everywhere for all the people of the United States. As a part thereof a determination that our dedication today of the great transcontinental alignment of the Bankhead Highway shall go down into history as the real beginning of a system built of national highways. A system built and maintained by our national government for peace and war. What more appropriate than the name of our great senator from Alabama for one of these highways? For he is not only your senator. He is mine and ours of the North as well. He is first an American among us all. He has labored unceasingly for the good roads we want and need so badly. We want his name commemorated and this great highway to bear it, that those who come after us may remember his work.

But of equal importance to our national roads we must have a complete system of state highways interlocking with the national system. The Alabama Good Roads Association primarily stands for that while co-operating with the United States Good Roads Association and the National Highways Association in the work of the nation.

Minor Organizations Urged.

But these national and state organizations are not enough. Each and every one of our counties should have their good roads organizations like your Jefferson County Good Roads Association. They can be of inestimable value in their co-operation with state and national associations to bring about good roads everywhere.

But even more than all this our state, **Ala.**

*Address by Charles Henry Davis, C. E., President National Highways Association, at the joint meeting of Bankhead Highway Association, United States Good Roads Association, Alabama Good Roads Association, Jefferson County Good Roads Association, held at Birmingham, Ala., April 17, 18, 19, 20, 21, 1917.

our county and our township or town good roads associations should affiliate and become part of one great national organization and thus make their work effective and felt throughout the nation. All national organizations should do likewise. Else good roads everywhere will not be attained in time for our protection and preparedness. It is for this that the National Highways Association stands and invites affiliation, co-operation, organization and distribution from each and every one, promising in return full measure to each and all.

National Undertaking Advocated.

But how are we to attain this great purpose—Good Roads Everywhere? Only one way. Only by the road followed in other countries. Only by the road whereby good state highways have been attained. There is no other road to Good Roads Everywhere than by and through a system of national highways built and maintained by national government. The great Bankhead Highway can never be built and finished any other way.

Many people in the small northeastern section of our country are antagonistic to the national government engaging in road building. This section comprises the six New England states and New York, New Jersey and Pennsylvania. Comparatively few people in the South, Southwest, Mississippi Valley States, Northwest, Rocky Mountain regions and the Pacific states, comprising the rest of the country, appreciate or understand this antagonistic point of view. This objection is not confined to a particular plan, but to any participation in such an undertaking by the national government. Of course all easterners are not so opposed. The big, broad minded, far seeing men of vision know to the contrary.

Elimination of "Pork."

Many people also do not know the vital difference between so-called "Federal Aid" and national highways. The former means gifts of moneys to the states to help build roads. Various plans for this

are suggested, but they are all fundamentally unsound because of the "aid" or "gift" feature contained in all. This method relieves the Federal Government of all responsibility and will inevitably result in "pork" and not in roads. National highways on the other hand limit the mileage and fix the responsibility where the people can see and judge of the honesty and efficiency of their public servants and thus assures the money getting into roads.

If there is one section of the country more than another where the good roads movement, as an issue or propaganda, has not gained a foremost place in the minds of the people, it is the northeast corner, comprising New England and the Middle Atlantic States; Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey and Pennsylvania.

Conservatism in New England.

There are many reasons for this, the most important being the following:

The states above named are as a group the oldest and wealthiest in the Union. Their population is comparatively dense. Large and wealthy cities abound. Their roads, while not by any means approaching what they should be, are in general superior to those of the remainder of the country. Much more money has been available for their improvement than for those located in the newer, more sparsely settled, and, therefore, poorer states.

The percentage of improved roads in this northeastern corner is 14.47 per cent. In the remainder of the country only 7.83 per cent. are improved, or relatively about half as great. The northeast has 12.2 per cent. of the total mileage of all public roads, while the rest of the Union has 87.8 per cent. On the other hand, the East has little to be proud of. This seeming superiority is really not as great as should be expected. The population is 28 per cent. of the whole; the wealth, 30.4 per cent.; the area, only 5.4 per cent. Surely the East has little to brag about

with such greater advantages. This is more clearly brought out by the following table:

POPULATION (1910).	
Whole United States.....	91,972,266
Northeastern corner.....	25,868,578
Per Cent.....	28.0
Wealth (1912).	
Whole United States.....	\$187,739,071,000
Northeastern corner.....	57,017,089,790
Per Cent.....	20.4
Improved Roads (Miles).	
Whole United States.....	190,476
Northeastern corner.....	38,868
Per Cent.....	20.2
Land Area (Square Miles).	
Whole United States.....	2,973,890
Northeastern corner.....	161,976
Per Cent.....	5.4
Public Roads (total miles).	
Whole United States.....	2,199,646
Northeastern corner.....	268,534
Per Cent.....	12.2
National Highways (proposed).	
Whole United States.....	50,485
Northeastern corner.....	5,143
Per Cent.....	10.1

Wonderful Progress of South.

Thus it is shown that the Central Western and Southern States have made greater progress in road construction in relation to their wealth, population and area, and, therefore, ability, than the Eastern States.

But possibly the greatest factor which causes some eastern people to be relatively phlegmatic in regard to good roads, or possibly even antagonistic to them, is that this movement has now come to direct its attention very largely upon the national government participating in road construction. The reason is not hard to find. Among all the various plans which from time to time have been advanced either for "Federal Aid" to the states or for national highways, there is none which, upon casual inspection, appears to give the eastern states a fair share of the money or roads as the case may be. With most of the plans this criticism is quite just. On the other hand a system of national highways can be so designed and its financing so arranged that no such criticism will be justified.

As a Problem in the West.

When an easterner looks at a map of the United States upon which are drawn a number of lines, all of equal weight, representing a system of national highways, he is quite likely to say to himself, "the sparsely settled western states get most of the roads, whereas we of the thickly settled East will have to pay for them." Most likely he will not stop to think that the roads would not all be constructed of the same materials and be of the same width and thickness, thereby costing the same amount per mile to build.

Without attempting to designate what type of road should be built in any section of the country, or to predict the cost of same, it is quite apparent that to build an expensive asphalt boulevard in a sparsely populated district would be money thrown away. Likewise, to build a light, water bound, macadam road to connect two large cities, a short distance apart, would be worse than folly. It is therefore, obvious that national funds for national highways would be spent in an equitable manner, dependent upon the

relative traffic which the designated roads would have to carry and which in turn bears a close relation to the density of population.

Another Eastern Objection.

A second objection which an eastern man might offer against national highways is that many of the through roads of the East have already been improved at state or local expense. To turn these over to the national government for national highways would, therefore, appear to mean a double contribution to this work. The answer to this argument is that a fair compensation should be paid by the government for all improved roads thus taken over.

If, however, national highways should still seem to produce a balance to the good for the West and South over the East, such favoritism would still be only apparent and not real, for many reasons. The improvement of those roads which naturally would comprise a system of national highways will be primarily of national benefit also. To within a short time roads were always considered of purely local interest. For this reason more than any other they have remained unimproved. It is not necessary to go into arguments to prove how each individual road has its proportionate effect upon the prosperity and welfare of the entire country. As a typical example the following will indicate how the East must vastly benefit by good roads in the West.

As to Manufacturing Sections.

Practically half (47.5 per cent.) of the manufactured products of this country are made in factories located in the previously named eastern states. Their area comprises only about five per cent. (5.4 per cent.) of the total area of the United States. On the other hand the raw materials used in this manufacturing come very largely from the remaining ninety-five per cent (94.6 per cent.) of the country. The great army of people in the East, dependent for their living upon these manufacturing establishments, should therefore be greatly interested in the roads of the West, over which their

raw materials must be hauled for a greater or less distance. A like argument also applies to the raising of farm products in the West and their consumption in the East.

A slightly different viewpoint can be illustrated by reference to the State of Montana. The great copper mines which produce so much wealth in this state are largely owned in Boston and vicinity. Do not these eastern residents owe it to Montana to help provide for their roads, as well as the roads of Massachusetts? The railroads of the West are mostly owned in the East. So are many other industries. The East automatically gains immense profits out of the activities of the West. National highways will automatically return some of it where it will again redound to the benefit of the West only to react favorably on the East.

Benefit of One, Benefit of All.

One could go on citing examples of this kind without number, all proving the great truth that whatever benefits one portion of a nation benefits the whole nation. This must be admitted by all except those afflicted with an abnormal amount of sectional pride, or greed. And in view of this fact it is believed that no one can offer any sound objection to this building of a comprehensive system of national highways — highways built, owned, maintained and controlled by the people, East and West and North and South.

The 39 states of the Union outside of this small northeastern section have 78 votes in the United States Senate to 18 representing the nine northeastern states. Some of these 18 are big enough and broad enough to know the untold value of such a system of national highways. These 39 states also have 312 votes in the House of Representatives, while the nine northeastern states have only 123 votes, some of which also know and understand the economic, financial, social and moral value of national highways as the only vehicle by which the nation can attain good roads everywhere.

ROAD WORK IN NEW HAMPSHIRE

No Detours Around Construction Under Way—Snow Still Blocks the Notches

The highway commission of the State of New Hampshire reports that highway construction work is contemplated on the Central Trunk line from Newport to Claremont. No detours, however, will be necessary, as there is a parallel road from Newport to Claremont, which will be in good condition.

Construction work is also being done upon the Rockingham road, from Manchester to Salem, but no detour is necessary.

Considerable resurfacing and oiling work will be done upon many of the roads of the state as the season advances, but the roads will be adequately posted and kept open for traffic.

As the season is unseasonable, none of the mountain roads, or the roads through the notches are yet open. But a fortnight ago there was still three feet of snow in Franconia Notch; and the same condition exists in the other notches. It will be nearly June 1 at least before these roads are open for general automobile traffic.

MONTREAL-QUEBEC HIGHWAY.

The road between Montreal and Quebec is in very good condition for motor vehicle traffic, we have been advised by the manager of the Ritz-Carlton, Montreal. It has now been macadamized for nearly the whole length of the route.

Speedway Events Turned into Red Cross Benefits

Patriotism and Training Value Found in the Track Meets Which Remain on the Season's Much Restricted Program

IMMEDIATELY following the close of the Universal Trophy Race at Uniontown, Penn., the speedway fans, in looking forward into the season, find the outlook anything but encouraging for an exciting and successful season, although there is promise of several events which prove highly interesting. The main feature of the season, however, has been eliminated with the announcement from the contest board of the American Automobile Association that it had decided against holding the 1917 racing championship on account of the withdrawal of a number of speedways from the game

event being withdrawn from the calendar was not alone a great blow, but the management also announced that the Speedway Association had withdrawn the track from the circuit for the year.

In connection with the canceling of this important date from the season's schedule, a pathetic and disappointing incident is related. The Fiat Company of Turin, Italy, makers of the Fiat cars, which have been identified with racing

At the present writing, however, the events scheduled on the other speedways will be carried out as per programme. Four contests are to be run on Decoration Day, including events at Newark, Washington, D. C., Uniontown, Penn., and Cincinnati, O.

The latter event was designated as a championship event and promises to be a fast contest, the entries to date including the following well known drivers: Ralph De Palma, Packard 12-cylinder; Ralph Mulford and Ira Vail, Hudson Specials; S. Ostweig, Ostweig Special; Omar Toft, Omar Special; Jack Le-



Ralph De Palma.



Dario Resta 1916 Champion.



Earl Cooper.

and reasons resulting from the outbreak of war. This, of course, means that there will be little or nothing in the season's schedule to continue the thread of interest in the racing games as there has been in the past when one had an opportunity to watch the progress of the different drivers toward the goal of American championship.

At the outbreak of the war there was considerable talk about organizing a corps of dare devil speedway artists as army aviators and at the time, despite the great activities in preparation for the coming racing season, it appeared as though the season's sport would be spoiled through lack of contestants. Nothing came of this movement, however, and practically all the speedway drivers were free to enter the game. Since then, however, other developments came up that promise to greatly restrict the programmes, in particular the withdrawal announcement by the management of the Indianapolis Speedway, where the great 500-mile classic was scheduled for Decoration Day. This

almost since its inception, despite the fact that they were overcrowded with war orders, had designed and constructed two special racing cars which were to have been sent to this country to make their initial appearance at the great Indianapolis classic. Great trouble and expense was involved in securing permission to engage in this enterprise by the makers, and many obstacles had to be overcome to provide necessary shipping arrangements. When all these troubles had been surmounted, and, in fact, the cars were on the decks at Genoa awaiting shipment and the allotted drivers had secured passage for this country, only the danger of being torpedoed remaining, the officials of the company were notified that America's classic automobile racing event had been canceled. They were so chagrined that they immediately decided to retire from the racing game.

The announcement by Harry S. Harkness, who is now practically the sole owner of the Sheepshead Bay Speedway at Long Island, that he was going to plant potatoes in the centre of the big oval which has in the past two years witnessed some of the most exciting races of the season, is taken to indicate that no contests will be held there this year.

Cain, DeLage; Jules De Vigne, De Lage; Eddie Hearne, Duesenberg; Pete Henderson, Mercer; Walter Haynes, Mercer; Louis Fontaine, Mercedes; Billy Taylor, Newman Stutz; two Duesenberg specials entered by F. S. Duesenberg, drivers not named, and a car entered by the De Palma Manufacturing Company.

Much interest is also centred in the third annual motor derby to be held at the Chicago Speedway on June 16. Special features have been incorporated in the event this year, which will include, in addition to the main race of 250 miles, a military and motor parade, amateur drivers' contest, aeroplane manoeuvres and demonstrations, polo game, hurdle jumping, military drill and band concert. Ruth Law, who made a record flight from Chicago to New York; Katherine Stimson, Baxter Adams and Billy Brock will fly.

From a racing point of view, however, the Chicago Derby will be most interesting as the first occasion on which Barney Oldfield will enter the field in his new speed creation, the Oldfield Special,



Howard Wilcox.

which was built by Harry Miller of Los Angeles and which has many novel features of design never before incorporated in the racing car. This car has a body somewhat along submarine lines, which entirely encloses the driver and mechanism and is so upholstered and appointed that in case of a bad mix up, or jump from the track, or through the railings, the occupants are protected against injuries other than a bad shaking up. Barney has kept the fans well entertained during the 16 years that he has piloted racing cars, but many believe that this year he will reinstate himself among the champions again, a place which he relinquished to younger and less experienced drivers in the past several years.

Another feature in connection with the Chicago Derby is the fact that a major portion of the gate receipts will be devoted to Red Cross work and relief corps.

At Uniontown on May 30 there will be a 112½-mile race for dealers; two local events of 11¼ miles each and a handicap race to wind up the programme.

Dario Resta, last year's champion, is not expected to appear in the speedway contests this year with his invincible Pugeot, and many of the other former stars have decided not to compete in this season's contests, although it is not expected that their retirement is permanent. In fact, it is not entirely impossible, as the days go by, with the President urging that college athletics be not abandoned, auto racing, too, may enlarge on the side of its patriotic and military features.

Howard Wilcox, who was married at Indianapolis during the early part of the month, has not entered in any of the contests to date and is silent as to his future plans. Following his marriage he set out on his honeymoon with his bride, Miss Katherine Dugan, in a racing car. When they arrived at Anderson, Ind., they were stopped by the police and Wilcox was jailed for exceeding the speed limit. He was taken from the jail after being incarcerated for an hour and the judge fined him \$35 and costs. Later he was summoned before the Mayor of the

city, who explained that the arrest was a joke, and his \$35 was refunded after he agreed to entertain a party of friends.

Louis Disbrow, who has been reinstated by the A. A. A. contest board, it is believed will not become active on the tracks this year, as his time is taken up by his duties as president of the Disbrow Motors Corporation, which manufactures the Disbrow car. It is believed, how-

ever, that he will put one of the Disbrow models on the circuit and that H. W. Kizer, his mechanic, will pilot it.

Eddie Rickenbacher, who stood third in the list for championship honors last year, will appear on the tracks this year with a Detroit Special, made by the De Palma Manufacturing Company, which is different from any car racing on the American speedways.

Stock Chassis World's Record

Joe Dawson Averages Nearly 95 Miles an Hour in Chalmers at Jacksonville, Fla.

Joe Dawson, the well known racing driver, who recently joined the engineering staff of the Chalmers Motor Co., drove a Chalmers stock chassis fitted with a racing body one mile in 38.10 seconds, or an average of nearly 95 miles an hour on the beach course at Jacksonville, Fla., on May 3, establishing a new world's record for a strictly stock car of under 231 inches displacement.

Seven trials were made over the mile course, the car taking a mile start each time. The speeds made varied from 38.1 seconds to 38.5 seconds, the latter being made on an exceptionally bad section of the beach, where traction could not be gained throughout the distance.

The Chalmers used is a small six of 3¼x4½ bore and stroke with a 115-inch wheelbase. It was fitted with a Stromberg carburetor, Westinghouse starting and lighting and Remy ignition equipment.

Joe Tracy, official representative of the American Automobile Association, was in charge of the trials and Fred Wagner started the trials and was responsible for the erection of the electrical timing apparatus that was used in accurately registering the record. The timers were Joe Tracy and Prof. R. A. Leavell of Iowa State College. Joe Gardham of the Chalmers factory prepared the car for the fast run.

The record for cars in the 450 cubic inch class was made March 30, 1911, by Howard Wilcox, driving a National, while the record in the 300 cubic inch class was established April 10, 1915, by Mulford in a Hudson, the first being made over the same course that the Chalmers

made its record and the second over the Ormond beach course.

The number on a Liberty Loan bond may not be enameled, but it doesn't have to be renewed every year. Buy a Liberty bond.

BAY STATE AUTOMOBILE ASSOCIATION'S RUN.

The Prosperity Run of the Bay State Automobile Association will be held June 16-18 inclusive. The rendezvous will be at the Farragut House, Rye Beach, N. H., where a ball and banquet will be held on Saturday evening. A big programme of sports has been arranged for the outing, including golf, tennis and baseball. Affiliated motor clubs from Maine, New Hampshire and Connecticut have been invited to participate.

ITALY AIDS TRACTOR BUYING.

The Italian ministry of agriculture has issued a notice fixing rules whereby agricultural bodies and societies in Italy may obtain a government contribution toward the cost of acquiring tractors for mechanical plowing. The grant will be conceded to these bodies up to 30 per cent. of the total cost, and, the board of trade journal states, this figure may be increased to 40 per cent. in the event of not less than five tractors being employed in any one province. In the case of private persons the grant will not exceed 20 per cent.



Joe Dawson Makes One Mile in 38.10 Seconds at Jacksonville in Chalmers Stock Chassis, a World's Record for Under 231 Inches Displacement.

**SCREW PITCH GAGE.**

There is no convenience that is more helpful to the repair man than a screw pitch gage with which the pitch of a thread may be determined. The gage illustrated, No. 4, has 24 pitches, ranging from four to 30, and the blades are cut narrow, permitting them to be inserted in small nuts, so that both internal and external threads may be measured. Each blade is marked with the number of threads per inch, as well as a decimal from which the drill diameter may be determined for drilling for either V or flat threads. It is also a convenient tool to use as a 60 degree centre gage and as a gage to test the grinding of either an inside or outside threading tool.

Manufactured by the L. S. Starrett Co., Athol, Mass. Price, \$1.25.

BEARING REAMER.

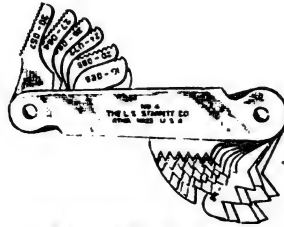
Every one familiar with the work of fitting main and connecting rod bearings of an engine knows that scraping connecting rods to line up with the cylinders is a very tedious job and if great care is not observed, very unsatisfactory. The Dyer Reamer is a simple tool, which is designed to eliminate this work and when used leaves a smooth, glassy finish to the bearing surface. The reamer has leads of .004 of an inch at the end of each fluke and is held in line by two adjustable bearings which are bolted to the crank case while it is being used. It can be seen from the illustration that by the employment of this tool the lining up of all bearings is fully assured.

Manufactured by the G. H. Dyer Co., Cambridge, Mass. Write for catalogue of tools and prices.

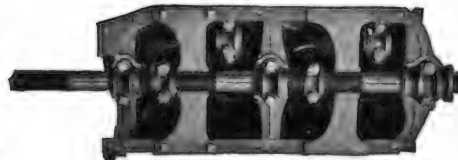
F-F BATTERY BOOSTER.

The F-F battery charging device is a magnetic rectifier for use on alternating current from any lamp socket of 60 cycles at voltages of 110, 220 or 20 per cent. higher or lower than normal and with a variation in frequency of 10 per cent., according to type of charger used.

A special transformer reduces the line voltage to the proper charging voltage without wasteful resistance. The change from alternating current to direct is accomplished through the use of copper and carbon electrodes actuated magnetically. By utilizing the negative, as well as the positive, alternations of the current, the full wave of alternating current is changed into a steady unidirectional cur-



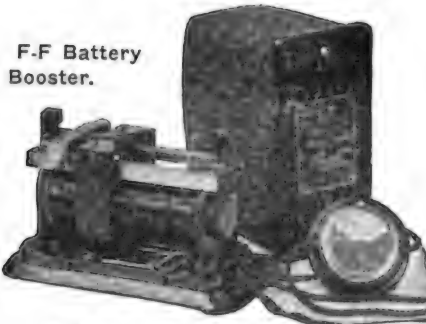
Screw Pitch Gage.



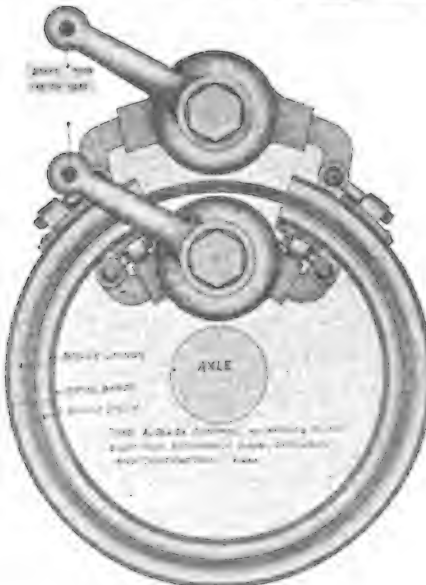
Dyer Bearing Reamer.



Adjustable Wrench.



F-F Battery Booster.



Al-Dem-Er Brake Control.

rent for charging batteries. A discharged storage battery can be recharged at a very high rate during the first several hours of charging, but should be reduced near the finish. This action is accomplished by the F-F battery booster, as, near the finish of a charge, when the voltage of the battery rises, the charging rate is automatically reduced to conform. The device is self-starting and when the alternating current is turned off or stops for any reason, the battery is cut out and cannot discharge through the rectifier. This action makes night charging practical. When desired two or more rectifiers can be connected in series or multiple on the secondary or load side to get various voltages and amperages.

Manufactured by the France Manufacturing Co., Cleveland, O. Price, \$15 complete.

ADJUSTABLE WRENCH.

An attractive and serviceable wrench is shown in the illustration. This wrench is of a somewhat different design from the ordinary wrench in that the adjustable jaw slides on two steel guide rods, which are cast into a polished aluminum handle. The jaws are made of case hardened steel and the adjusting nut of the small size wrench runs on roller bearings. This wrench is made in two sizes, six and 10-inch.

Manufactured by Goodell-Pratt Co., Greenfield, Mass. Price on large size, \$2; on small size, \$1. Write for special catalogue of 1500 tools.

SNAPS.

The word "Snaps", aptly describes the bargains to be found in the catalogue under that name. This bargain bulletin is issued to dealers only and quotes the prices upon many hundreds of standard articles far below the present market prices. Every dealer should have this booklet and may get it every month by writing on his letter head to

Service Motor Supply Co., 1528-1531 Michigan Blvd., Chicago, Ill.

AL-DEM-ER BRAKE CONTROL.

A chain is no stronger than its weakest link, neither is an automobile safer than its brakes. To be absolutely safe and perfect the brake action must be smooth acting, but not bind or lock. Many serious accidents have been caused by improperly adjusted or inefficient

brakes. The Al-Dem-Er brake control is said to be positive in action and not self locking. With this device practically all of the brake band contacts with the drum, whether expanding or contracting type, and it may be applied to practically any car on the market. The brake arm may be set at a number of positions to fit the car.

Manufactured by George A. Diemer, 298 First St., Newburgh, N. Y. Prices from \$10 up according to size and finish.

THE GREB EXTENSION.

The demand for truck delivery exists in practically every part of this country, and is constantly growing. The Greb Extension is designed to lengthen a Ford car to 115 or 130-inch wheelbase, thus making that pleasure car into an economical and efficient 1000-pound delivery truck. The equipment as furnished consists of two channel iron extensions, which are riveted to the frame, thus eliminating any possible chance of breakage. A universal and drive shaft assembly, all bolts, screws, rivets, lock washers and nuts complete with full directions.

Manufactured by the Greb Co., 202 State St., Boston, Mass. Price for 115-inch extension, \$55; for 130-inch extension, \$60.

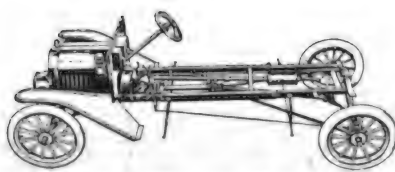
MOTOR SET.

The secret for keeping down the "haulage home" bills lies in the possession of a good supply of practical tools in the car. Many an autoist has been obliged to pay for a few hours time of an expert mechanic because he did not have the necessary tools to do his own work. The illustration shows a set of 27 handy tools for making all ordinary road repairs. They are contained in an extra heavy leather bound canvas roll and are held in place by long leather straps.

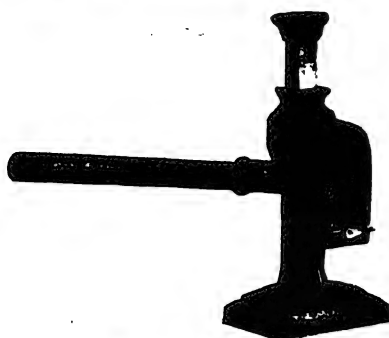
Manufactured by Goodell-Pratt Co., Greenfield, Mass. Price, \$15.

WARNERLITE SYSTEM.

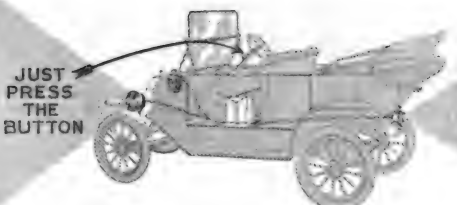
"A lighting system that solves the Ford car lighting situation" are the words used by the makers in describing their products. This system consists of two parts, each of which, though separate from the other, is complete within itself. The first, called the headlight outfit, consists of a regulator, by which the current from the Ford magneto is kept at a constant voltage and evenly distributed to the lights; two nitrogen lamps; a dimmer switch for attaching to the steering post and all necessary wire and material. With this system the headlights are wired in multiple so that should one lamp burn out or go wrong the other lamp would continue to burn. It is said that a good, strong, steady light is obtained at all speeds with this system. The second, or side and tail light outfit, consists of a 50 ampere-hour storage battery, which is guaranteed for two years; a Fordrectifier, by which the



Greb Extension Applied.



Hartford Auto Jack.



Warnerlite System.



Bill Spark Retarder Applied.



Motor Set.

battery is kept charged from the Ford magneto; three special bulbs for side and tail lamps; one two-point switch to be located on steering post and all necessary wire and material. Either of the systems may be purchased independently or both together, forming a complete lighting outfit.

Manufactured by the Warner Lamp Co., Davenport, Iowa. Price for first system, \$7.50; for second, \$17.50; for complete Warnerlite system, \$24.

HARTFORD AUTO JACK.

Absolute reliability is essential for every automobile jack, and such is claimed for the Hartford Auto Jack, which is constructed by skilled workmen. The gears are turned from solid steel and are encased in a malleable iron housing with a broad, firm base. The gear ratio, together with the long handle and short stroke, admits the easy lifting of great weights. It is claimed that a pressure of 15 pounds on the handle develops 1000 pounds of lifting power on the rack: sufficient force to lift the largest car with ease. This jack is finished in black enamel and is a practical equipment for any car, light or heavy.

Manufactured by the Edward V. Hartford, Inc., 147 Morgan St., Jersey City, N. J. Write for catalogue and prices.

BILL SPARK RETARDER.

The danger attendant upon hand cranking of a gasoline engine is due solely to the liability of a quick back throw, or as it is sometimes called, a "kick" of the crank, due to premature ignition occurring when the flywheel has not attained sufficient momentum to overcome the quick and powerful back thrust on the crankshaft. If the spark is so retarded as to cause explosion after the piston has passed the top of the stroke, the engine frequently does not receive enough impetus to carry the flywheel over centre and so "dies" from lack of power. The Bill Automatic Spark Retarder is said to prevent either of these possibilities in that by its use the spark is automatically retarded for starting, and upon the first explosion of the engine, advanced to predetermined running position. The device is not complicated, but the action is positive and the benefits derived should amply repay one.

Manufactured by Bill Manufacturing Co., La Porte, Ind. Price, \$3.50.

BARGAIN BULLETIN.

An interesting catalogue of automobile accessories and parts at very low prices is issued by what has been termed as one of the world's greatest automobile orphanages. This catalogue is fully illustrated and contains many bargains. As an instance of this a four-cylinder, 18 horsepower engine is priced at \$60 complete.

Write for this Puritan Bargain Bulletin No. 4619 to Puritan Machine Company, 51 10th St., Detroit, Mich.

WRENCH DISPLAY SET.

The display and stock set of offset and tee handle wrenches illustrated, is designed to be used as a silent, ever-working salesman in the supply station. An essential point on all wire handle wrenches is the method of attaching the socket to the wire so that it cannot work loose or turn. The Walden Worcester wrenches are made by special method. The wire handles are milled and driven into the oval shaped broached hole in the socket, making it impossible for the handles to turn or work loose. All sockets are made of steel, from a solid bar, and broached accurately to size. They are shaped to allow a maximum of clearance in use, but with full allowance of stock for proper strength.

Manufactured by Walden-Worcester, Inc., Worcester, Mass. Prices upon request. Special Ford sets.

SOCKET WRENCH SET.

There is no tool used around the automobile more than the ordinary socket wrench. Hence it is a good investment, either for the owner or the repair man. The set illustrated consists of a No. 419 ratchet socket wrench with a $\frac{3}{4}$ -inch hexagon socket (which may be obtained separately) and four extra sockets fitting it. These extra sockets have $\frac{1}{2}$, $\frac{11}{16}$, $\frac{13}{16}$ and $\frac{7}{8}$ inch hexagon openings. The ratchet socket wrench has a seven-inch black enameled iron handle and a very strong ratchet that can be used for either right or left hand work. The lignum-vitae head runs on ball bearings. Each set is packed in a strong and attractive hard wood box.

Manufactured by Goodell-Pratt Co., Greenfield, Mass. Price of set \$3.50. Price of socket wrench with $\frac{3}{4}$ inch hexagon socket, \$1.70.

SOOTLESS PLUG.

In the Feb. 25 issue of the Automobile Journal, as well as the March issue of the Accessory and Garage Journal, a description of the J. M. Soot-Proof Plug, together with an illustration, appeared. The maker's name was inadvertently given wrongfully as H. W. Johns Manville Co., New York City. The Sootless Plug is of unique construction, having a double explosion chamber, with the sparking points extended well into the mixture. The engine end of the plug is well protected, having a porcelain cap, so arranged and enclosed that it is protected against breakage by a metal housing. There are no asbestos packings used in the construction and it is said that compression and high pressure tends to tighten rather than loosen it. Being practically oil and soot proof, it is especially adapted for use in engines that use a large amount of lubricating oil.

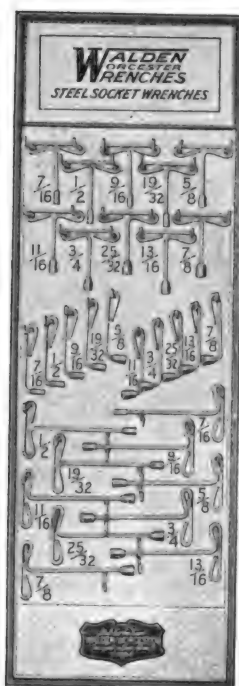
Manufactured by the Oakes & Dow Co., Boston, Mass. Prices upon application.



"Helping Henry" in Use.



Prest-O-Lite Cooker and Lighting Attachments.



Above, Sootless Plug; at Left, Wrench Display Set.



Socket Wrench Set.

1500 GOOD TOOLS.

"Fifteen Hundred Good Tools" is the title of tool book No. 13 issued by Goodell-Pratt Company of Greenfield, Mass. This great, little book is $3\frac{3}{4}$ by $5\frac{1}{2}$ inches, contains 432 pages, and is fully illustrated. Not only is this book useful as a catalogue, but also as a reference.

This book is free to everyone sending their name and address to Goodell-Pratt Company, Greenfield, Mass.

PREST-O-LITE COOKER.

The advent of the Prest-O-Lite camp cooking outfit will bring joy to the camping motorists who have long sought a compact and convenient stove for touring. As an added convenience, an ideal camp light may be provided, as shown in the illustration. The stove, or Auto Hot Plate, as it is called, measures eight by eight by five inches and weighs but six pounds complete and may be stored away under the seat of the automobile. The stove when turned full on consumes about $3\frac{1}{2}$ feet of gas per hour, and is designed to be attached to the regular Prest-O-Lite tank. The heat of the full flame is sufficiently intense to boil a quart of water in three minutes. When the lighting outfit is used a two-way valve union is attached to the tank, one outlet being connected with the light, the other with the stove.

Manufactured by the Prest-O-Lite Co., Inc., Indianapolis, Ind. Prices upon application.

"HELPING HENRY."

A novel device for the car owner, designed to be used for the utilization of engine power for other purposes than the driving of the automobile is introduced under the name of "Helping Henry." This device consists of a strong channel iron frame upon which is carried a jack shaft fitted with three pulleys and a jacking arrangement of malleable castings fitted with long hand levers by which the rear of the automobile is raised from the ground. The entire weight of the apparatus is 135 pounds and it may be carried on the running board to the place required. The application of the device is simple. It is rolled beneath the rear of the car, the hand levers pushed downward so that the rear is lifted from the ground, which brings the wheels into contact with the pulleys on the end of the "Helping Henry" jackshaft. When the engine is started and the clutch and gears thrown in, the jackshaft turns from the friction of the tires with the pulleys and power may be taken from the third pulley by means of a belt. Different speed ratios may be obtained by changing the gears in the gear-set, by throttle adjustment and by the use of different sized pulleys on the jackshaft, making "Helping Henry" a very handy device for all sorts of work.

Manufactured by Autopower Co., La Porte, Ind. Write for descriptive literature and prices.

GABRIEL SNUBBER.

No car is considered up to date without some form of shock absorber, either as an accessory or incorporated in the design. The Gabriel snubber is an accessory shock absorber which is designed to protect the car by the elimination of vibration, to prolong the life of tires by keeping the wheels on the ground and giving traction. They are easily applied upon practically any car now on the market. When ordering mention the name, model and year of car.

Manufactured by Gabriel Mfg. Co., Cleveland, O. Distributed in New England by W. J. Connell Co., 171 Massachusetts Ave., Boston, Mass. Prices upon application.

PNEUMATIC JACK.

Jacking up the car is one of the necessary evils which the motorist is bound to face sooner or later. When the rear springs, body or spare tires are in the way, it is often a big problem to raise the jack after it is placed either on the car or the road without soiling the clothes. The National Pneumatic Jack is operated by air pressure, forced through a long flexible tube by either an ordinary hand or power pump. It is claimed that the air pressure will hold up a car for at least several hours, and usually several days. A mechanical lock is provided to hold up car for storage. The makers cover it by a liberal guarantee and will send it for a 10 days free trial.

Manufactured by National Motor Supply Co., Cleveland, O. Price, \$6.

THE S-H TIRE PUMP.

Designed with the intention of eliminating tire inflation trouble, the S-H tire pump should prove a boon to the motorist. This little pump is only 10 inches long by four inches wide and weighs but seven pounds. To operate it is only necessary to jack up one of the rear wheels, place the friction wheel of the pump under the tire, start the engine and a steady flow of air for tire inflation is furnished. The equipment consists of the pump, a tire gauge and a long, flexible air hose.

Manufactured by the S-H Pump Co., Chicago, Ill. Price complete, \$8.

TWIN FIRE SPARK PLUG.

The cause for misfires and skipping of engines can oftentimes be traced to faulty ignition or poor spark plugs. If the plug is broken down or the insulation imperfect the efficiency of the engine is considerably impaired. Particles of carbon between the ignition points is also one cause of failure. In the Twin Fire spark plug two sets of ignition points instead of one are provided. Even if one set of points should happen to get carbonized or short circuited, the spark is still furnished at the other gap.

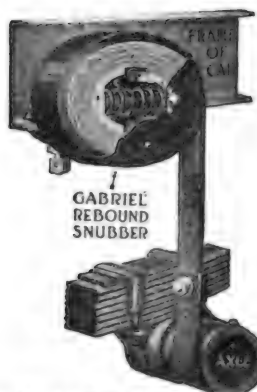
Manufactured by Twin Fire Spark Plug Co., 652 Woodward Ave., Detroit, Mich. Prices upon application.



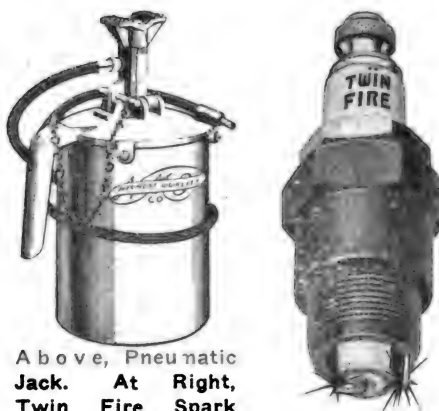
Circular Glass Cutter.



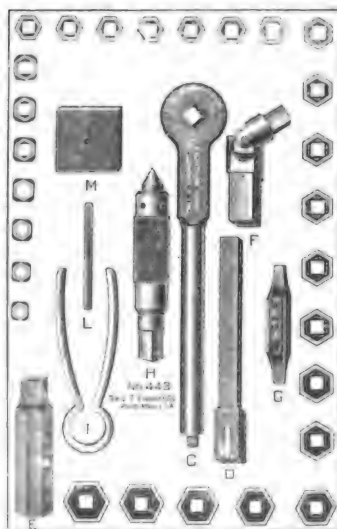
The S-H Tire Pump.



Gabriel Snubber Attached.



Above, Pneumatic Jack. At Right, Twin Fire Spark Plug.



Components of Starrett Ratchet Wrench Set.

STARRETT RATCHET WRENCH.

In places difficult of access or in cramped quarters where a swing through a long arc is impossible, the ordinary monkey or S wrench is out of the question. Some other means of turning nuts and bolts is required. To meet these conditions the Starrett ratchet wrench has been designed. It consists of a ratchet with reversible pawl and a long wrench handle (C). With this wrench is also furnished an extension (E) to reach into otherwise inaccessible places; also a universal joint (F) for turning nuts or bolts when it is impossible to get the wrench on at right angles to the ends of the bolt; a spark plug socket (E); a drilling attachment (H), which takes standard square shank drills from 1/8 of an inch to 1/2 inch diameter, and a screw driver (G) with reversible end; together with several adjustments to go with the drilling attachment.

Manufactured by the L. S. Starrett Co., Athol, Mass. Price complete, \$15. Without drill fixtures, \$12.

CIRCULAR GLASS CUTTER.

There is a constant call for replacement of headlight glasses that are so frequently cracked or broken, yet very few garages are equipped to cut circular glasses for replacement with any degree of accuracy or speed. The glass cutter shown in the illustration has a graduated beam that can be quickly and firmly set to cut circles of any size from two to 12 inches in diameter. Each of the cutters is provided with a high grade cutter wheel which has been carefully honed and tested by actual cutting before being mounted in the tool. The standard is equipped with a rubber base to prevent slipping.

Manufactured by Goodell-Pratt Co., Greenfield, Mass. Price, 70 cents.

FORD TRUCK ATTACHMENT.

The Woodward Truck Attachment for Ford cars is a two-speed sliding gear transmission gearset which is designed to be applied to the drive shaft of a Ford car by removing seven inches of that member and coupling the attachment in that space. When installed four speeds are available, with gear ratios of 21 to one, 12 to one, 6 1/2 to one and 3 7/11 to one. This latter speed is the same as the present high speed of the Ford car and is a direct drive. In addition to the four speeds forward there are two backward and a neutral point. If it is desired the old drive shaft and tube may be exchanged for the complete assembly drive shaft at no additional price over the purchase price. The transmission gears are of nickel steel, shafts of vanadium or nickel steel, running in bearings of velvet bronze.

Manufactured by Woodward Truck Attachment Co., 235 West Pico St., Los Angeles, Cal. Price for transmission complete when drive shaft and tube is exchanged, \$45.

HACK SAW FRAME.

Many shops find it economical to use different length saws for different grades of work. This is impossible with a solid back hack saw. The hack saw frame illustrated is designed to take saws from eight to 12 inches and may be set to cut in any one of four directions. The saws are tightened into place by turning the handle and it is said that it cannot be cramped when saws are strained up nor will it tremble when used. All metal parts are polished and nickel plated.

Manufactured by the L. S. Starrett Co., Athol, Mass. Price, \$1.

LAMINUM.

Laminum is a substance consisting of a number of sheets of brass .002 or .003 of an inch thick, firmly held together by a metallic binder. The appearance is that of a solid piece, yet each sheet may be peeled off, leaving the thickness slightly less than before. It may be purchased in sheet form as illustrated, or made up into the shape of bearing shims. After the leaf has been peeled off the resulting surface is said to be absolutely smooth, without grain or grit of any kind. The advantages claimed for this type of shimming material are that it is solid, offering no surface for grit to adhere to and that necessary adjustment may be obtained without filing, leaving the surface smooth and flat.

Manufactured by Laminated Shim Co., Inc., Canal St., New York, N. Y. Send for booklet and prices.

SPRING LUBRICATOR.

An important factor in the comfortable riding qualities of the automobile is the lubrication of the springs. Because of the difficulty encountered in forcing grease or oil between the spring leaves, many operators neglect this important duty. To facilitate this operation, the Tomahawk graphite spring lubricator has been designed. It consists of a case in which graphite grease is inserted, and a double wedge spring separator, through which the grease may be forced in a thin stream. The back of the wedge is fitted with a striking head. When it is desired to use the device the car is jacked up and the tool inserted between the spring leaves, either with the pressure of the fingers or a light tap of a hammer. The grease is then forced out by screwing up on the handle. A spring lubricant is put up in tube form, making it an easy matter to refill the Tomahawk grease container. Each tube contains sufficient lubricant for 2000 miles.

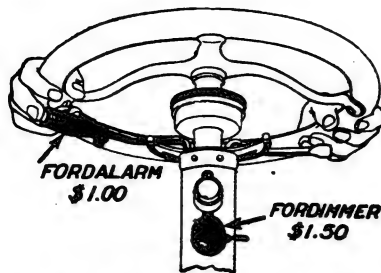
Manufactured by Charles W. Manzel Co., 309 Beard Ave., Buffalo, N. Y. Price of Tomahawk Lubricator, \$1.25; of Graphite Spring Lubricant, 50 cents a tube.



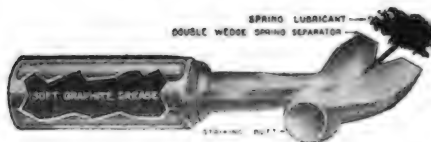
Hack Saw Frame.



Laminum in Sheet Form.



Fordalarm and Fordimmer.



Tomahawk Lubricator and Grease Tube.



Pipe and Cigar Lighter.

PIPE AND CIGAR LIGHTER.

There is nothing more annoying to the motorist than to be obliged to slow up his car or pull up to the curb in order to light his pipe or cigar. The device shown in the illustration herewith is designed especially for lighting the pipe, or can be used equally well for lighting a cigar or cigarette. When the motorist wishes to light his pipe or cigar he simply reaches for the lighter, takes it from the holder, presses the button and a light is immediately available, wind or weather making no difference to the action. The pipe lighter is equipped with 10 feet of cord and designed for connection with the storage battery. The cord is automatically reeled up when not in use upon a special winder by spring tension.

Manufactured by the Metal Specialties Mfg. Co., 730-738 W. Monroe St., Chicago, Ill. Price complete with winder, \$4. Without winder, \$1.50.

FORDIMMER AND FORDALARM.

Two new Ford car accessories are shown in the illustration. The first is called the Fordimmer. By the use of this device the headlights may be dimmed at will by the driver, thus preventing headlight glare, which in many cities is prohibited. It is also a safety device in that the lights are kept from burning out at high engine speed. It is claimed that the voltage is regulated and that the ignition system is not affected by its use.

Many an accident has been caused by the dividing of the attention of the driver between the horn button and the wheel at a critical moment. At such a time both hands should be kept on the steering wheel. This situation is made possible by the use of the Fordalarm, a button mounted just beneath the steering wheel, on the end of the gasoline control lever. In emergencies the driver's hand is usually on this lever, and the second finger of the hand is always in position to press the alarm button if necessary and sound the horn.

Manufactured by Detroit Novelty Mfg. Co., Marquette Bldg., Detroit, Mich. Price of Fordimmer, \$1.50. Fordalarm, \$1.

INDIVIDUAL MONOGRAMS.

Besides adding to the beauty and individuality of a car, a monogram is a protection, to a certain extent, against theft. Individual monograms are manufactured in many different styles and are designed for application to the car by the transfer method. They are obtained from the manufacturer on tissue paper, backed with one or two thicknesses of paper, and are applied to the car by covering the letter or monogram with a thin coating of transfer cement, applying it to the car and then removing the paper. After application the letter is varnished over.

Manufactured by Motorists' Accessories Co., Mansfield, O. Write for descriptive booklet and prices.



Four-Passenger Roadster, a Light Weight Six, in the Chandler 1917 Series, with Neatly Designed Body.

THE Chandler Motor Car Co., Cleveland, O., introducing a number of new body designs in its line for 1917, presents notably in this respect a four-passenger roadster, a light weight six, model 17, flexible and smooth driving. Aside from a few changes in detail the six-cylinder chassis is the same as the one offered the previous season.

In design the bodies, with no warrant for changes of a radical nature since they reflect general tendencies, yet show a combination of features which afford the car distinctiveness, and show the clear conception of the designers to what is attractive and desirable. In the seven-passenger model the walnut paneled tonneau cowl is a feature. In the four-passenger there are divided seats in front, an aisle between and a rear seat for two persons. On each side of the rear seat is a wide arm rest, with which is incorporated compartment for carrying small items.

The three body types, according to schedule for June 1, are priced as follows: Seven-passenger touring car at \$1595, limousine at \$2895 and four-passenger roadster at \$1595.

The general tendency of machine design is toward simplicity and as the illustration shows the power plant of this machine is compact and simple. The engine, which is of the L head, six-cylinder type, is said to be regular in action,

due to the fact that the power impulses of each piston are so regulated that they overlap one another, insuring an even flow of power under all conditions whether at extreme speed or throttled down to but a few miles per hour.

With a bore of $3\frac{3}{8}$ inches and a stroke of five inches the output of the engine is $27\frac{2}{5}$ horsepower.

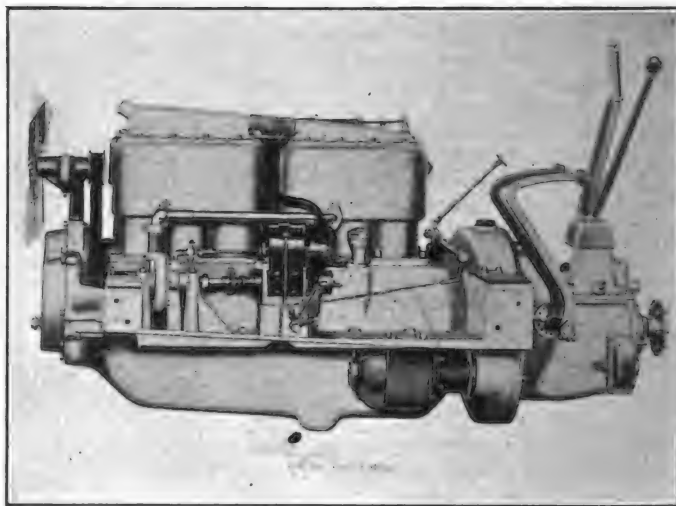
The cylinders are cast in blocks of three and are fitted with valve caps to facilitate the inspection or grinding of valves and with removable water jacket heads, which are in two units, connected with flexible connection, thus obviating the danger of cracking from possible strains or vibration.

The crank case is made in two sections; the upper part, to which are bolted the cylinder blocks, is flanged at the rear and expanded to contain the fly-wheel. At each side project shelves,

Features of the Chandler of Model 17

which extend to the frame of the car, forming a protection against dirt and road dust and providing base for both the generator and magneto. To this section is also attached the oil pump and water circulation pump. The lower section comprises the oil base of the engine and is readily removable.

An important part, upon which depends the vibrationless running of the engine, is the crankshaft. The crankshaft in this car is supported and mounted in three bearings, which are designed to afford ample surface to fully carry this mem-



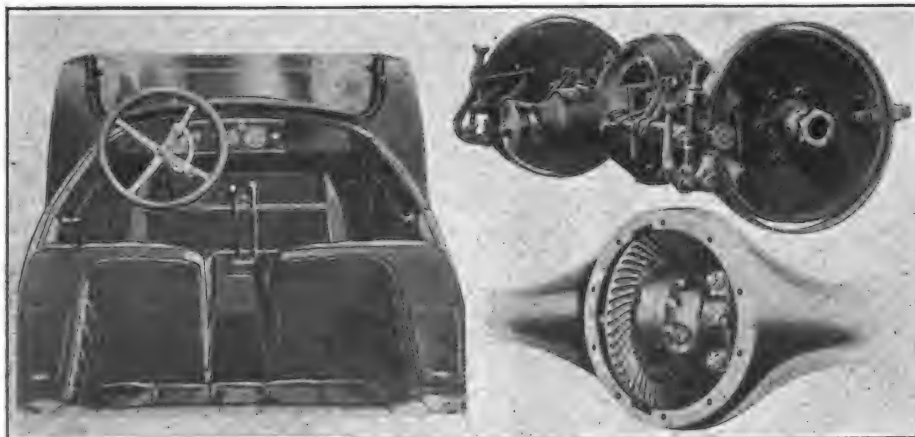
Compact Unit Power Plant, Showing Magneto, Water Pump and Starting Motor Mounting.

ber. The connecting rod bearings are equipped with laminated shims, so that proper adjustment may be easily made at any time with a minimum amount of work.

Both the camshaft and shafts for driving the generator, magneto and water pump are driven by silent chain, enclosed in a housing at the front of the crank case, which is well supplied with oil at all times by positive feed.

With the valves on the right side of the engine, entirely enclosed, but readily accessible for adjustment, provision is made to prevent warping, in that valve chambers are well cooled by water jackets.

Located on the right side of the engine and driven from the camshaft is a plunger oil pump, which draws lubricant from the crank case and forces it to the main bearings and chain compartment; the surplus oil draining into the base from the chains and into splash pans from the main bearings into which the connecting rods dip, splashing oil to other running parts. This oil pump is



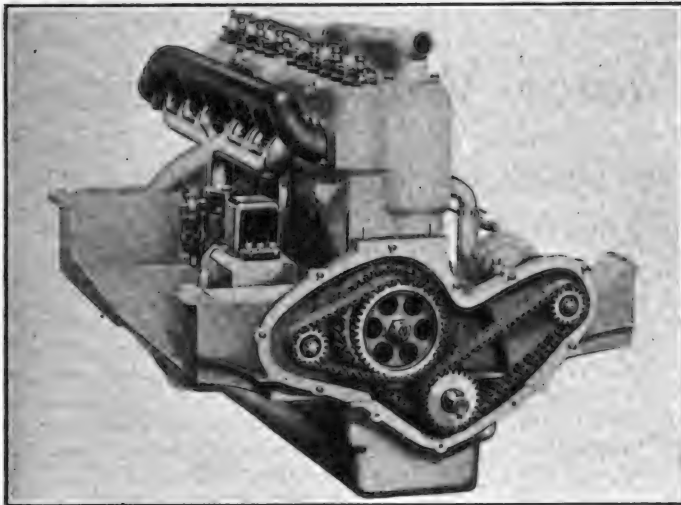
View of Chandler Roadster, Showing Aisle Dividing Front Seats—Full Floating Rear Axle and Bevel Driving Gear.

Four Passenger Roadster Are Disclosed

designed to furnish a maximum amount of oil required at all times and is non-adjustable, though it may be removed within a few minutes for repairs because of its accessible location and its construction.

Mounted just ahead of the magneto is the water pump, which keeps up a constant circulation through the cylinder water jackets into the radiator, which, in turn, is cooled by a large fan mounted on adjustable bearings and driven by a belt from the magneto drive shaft.

Fuel is supplied the engine by a standard hot water jacketed float feed

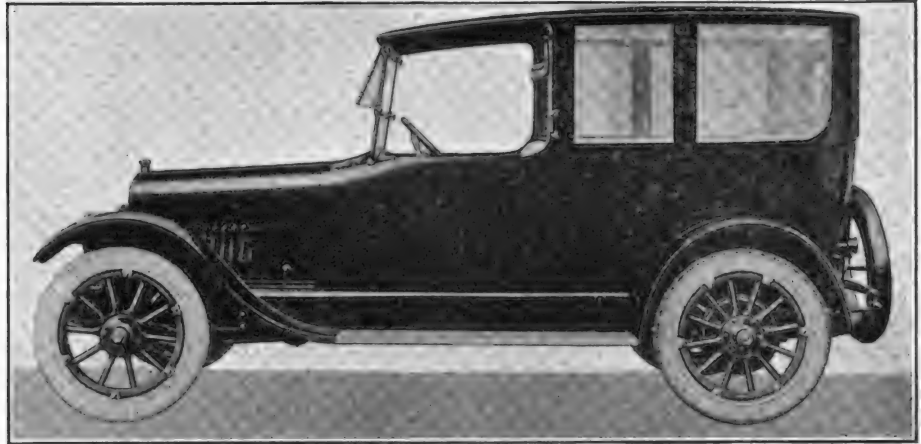


End View of Motor, Magneto, Camshaft and Generator Drives in Cutaway.

carburetor mounted on the right side of the engine and controlled by manually operated lever on the steering wheel. The carburetor is supplied with gasoline by a vacuum system with feed tank mounted on the dash.

Current for ignition is furnished by a Bosch high-tension magneto, single system, having no connection with the battery. By the use of this system it is claimed that much of the complications of electrical installation are eliminated and the ignition system is greatly simplified. As with the fuel, the ignition is hand controlled by lever on the steering wheel.

The engine forming a unit with the transmission gearset is mounted directly upon the main frame and suspended at four points. The front part of the gearset housing is expanded to fit the flange of the flywheel housing and contains the disc clutch, which is equipped with thrust bearings, which are lubricated from the transmission gearset through the hollow main clutch shaft.



Chandler 1917 Limousine, Graceful in Lines and Adapted to Motoring Comfort in Many Refinements.

Three speeds forward and one reverse are provided for in the selective, sliding gear, transmission gearset. The gears, which are made of nickel steel, are mounted on two shafts, one above the other, which run on ball bearings.

Connection between the transmission gearset and differential is by means of an inclosed propeller shaft, fitted with universal joints at both the gearset and rear ends.

The rear axle is of the full floating type and is designed with the idea of providing great strength and heavy duty. A large removable plate at the rear affords access to the differential assembly. The pinion and drive gears are cut

spiral bevel and are easily adjusted. The differential, which is mounted on roller bearings, contains four pinion and two differential gears.

The springs are semi-elliptic throughout, those in front are mounted directly beneath the frame, those in the rear,

through which the drive is transmitted, are supported outside the frame and are attached to the ends of cross members.

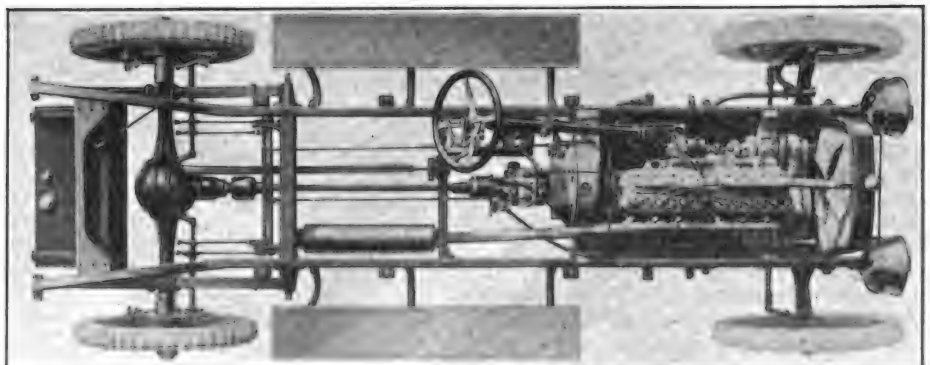
The wheelbase is 123 inches and both the front and rear wheels are fitted with tires 34 by four inches.

Mounted on the left side of the car, the irreversible type steering gear is easily adjusted for wear when necessary. The foot control consists of clutch, service brake and accelerator; the hand controls, consisting of emergency brake and gear change lever, are mounted on sector at the right of the operator in the centre of the car.

For starting and lighting the Gray & Davis two-unit system is used, generator being driven by silent chain, and starting motor operating through Bendix drive upon the flywheel.

GOVERNMENT ASKS FOR MOTOR CAR BIDS.

The Quartermaster's Department, U. S. A., will open bids on June 8 in Chicago for 74,000 motor vehicles as follows: One and one-half-ton trucks, 35,000; three-ton trucks, 35,000; half-ton trucks, 200; three-quarter-ton trucks, 200; five passenger touring cars, 1000; runabouts, 3000. The five-passenger and two-passenger cars are to be at \$1000 or under; touring cars at \$2000 and \$1500 or under. In addition the bids will cover 5000 motorcycles and 5000 motorcycles equipped with side cars.



Stripped Chassis of the Chandler Six, Model 17, Showing Unit Power Plant and Frame Features Behind the Rear Axle.



Thousands of Members of the Reo Family and Visitors Walked Through and Inspected the New Employees' Club House at Lansing, Mich.—The Views Show the Exterior, Dining Room and a Meeting Room Supplied with Many Comfortable Leather Chairs.

The Business Side of the Motor Vehicle Industry

What Several of the Leading Car and Parts Makers, Production and Sales Organizations, and Allied Lines Are Doing or Have Under Consideration.

The Reo Motor Car Company, Lansing, Mich., opened the spacious new club house for employees May 8, a \$150,000 structure, notable for its wide halls and rooms literally covered with comfortable leather chairs. A wide, homey looking veranda extends the whole length of the club house. On the right of the entrance are the doors to the auditorium, with its hundreds of seats, fine pipe organ and stage. There is a series of reading rooms and meeting rooms. In the basement are the dining rooms and kitchen, spotless and shining with cleanliness, where meals are served practically at cost to members of the company's large employed family.

Frank E. Barnes, recently superintendent of the King Motor Car Company, has been appointed production manager of the Eagle Macomber Motor Car Company of Sandusky, O., makers of the Eagle car, which is fitted with the Macomber air cooled rotary motor. A description of the Macomber motor was published in the December issue of the Automobile Journal. Mr. Barnes will take up his work immediately at the plant in Sandusky, which has been completely organized and prepared for production about July 1. He was presented with a watch and chain by the department heads of the King Motor Car Company. He began his career in the automobile industry 12 years ago with the Knox Motor Car Company, Springfield, Mass., and later was associated with the Stevens-Duryea, Buick, Elmore and Hupp

motor car companies.

The King Motor Car Co., Detroit, Mich., has appointed the following firms and individuals as distributors of King cars in their respective territories: Reeves & Adams, San Louis Obispo, Cal.; H. C. Bradley, Fort Collins, Col.; John Lentz, 63 High St., Oshkosh, Wis.; C. E. Nichols Motor Co., 8th and B Sts., San Diego, Cal.; Wm. Kelton Greever, Vernon, Tex.

E. A. Nelson, Detroit, Mich., maker of the Nelson car, has started production and is delivering two-passenger knock-

abouts, four seaters and a closed or open five-passenger sedan. In the open model the body is of foreign design and the cowl is omitted. The Nelson motor used on all models is a 12-15 horsepower engine. Prices on the Nelson models are: \$1200 and \$1400 for the knockabouts and four seaters respectively.

The Commonwealth Finance Corporation, New York City, has taken half of the second floor in the American Surety Co.'s building, 100 Broadway, that city.

The Goodyear Cotton Mills, Goodyear, Conn., offers to plow all employees' gardens free of charge.

P. D. Saylor, managing director of the Goodyear Tyre and Rubber Co. (Great Britain), Ltd., is now a captain with the Canadian forces in France, in the medical division.

G. M. Bicknell has been appointed sales engineer of the Carter Carburetor Co., St. Louis, with entire charge of the factory sales in and around Detroit, where he will make his headquarters at 836 Brush street.

John Whyte has been appointed chief engineer of the Bailey Non-Stall Differential Corp., Chicago, Ill. He is one of the well known engineers in the automobile industry and was recently with the Prest-O-Lite Co., Indianapolis, as engineer of battery service.

Frank E. Sangbush has been appointed sales manager of the Columbia Motors Co., Detroit, Mich. He recently resigned as sales manager of the Abbott Corporation.



Frank E. Barnes, Appointed Production Manager of the Eagle-Macomber Motor Car Co. of Sandusky, O.

The Westinghouse Electric and Manufacturing Co., East Pittsburg, Penn., reports net earnings for the fiscal year ending March 31 of about \$18,300,000. The surplus as indicated by the advance figures will be approximately \$20,000,000 after paying off millions of dollars in notes. The earnings for the year compare with \$9,666,789 during the corresponding period ending last year.

The Locomobile Co. of America, Bridgeport, Conn., makers of the Locomobile car and Riker trucks, report a steady increase in domestic business. Up to May 15 the company had delivered 34 per cent. more machines than during the corresponding period last year.

The Dowse Rubber Co., recently incorporated with an authorized capital of \$2,500,000, to manufacture articles of every description from rubber, has adopted the trade mark "Dowse-Durability." On or about Aug. 1 the company will take over a completely equipped plant in Chicago, which is at present operating under other management.

Fuller & Sons Mfg. Co., Kalamazoo, Mich., makers of automobile parts, has let a contract for the installation of a new heating plant to heat the old and new plant of the company. The new four-story factory building is being rapidly completed.

K. W. Zimmerschied, metallurgist of the General Motors Co., is now in Washington in charge of the offices of the Society of Automotive Engineers, now opened in the Munsey building.

D. McCall White, chief engineer of the Cadillac Motor Car Co., Detroit, Mich., has resigned and it is said he will take up work in aeronautics.

W. H. Taneyhill has been appointed general sales manager for the Scripps-Booth Corp.

J. G. Murphy, who has been connected with the Pierce-Arrow Motor Car Co., Buffalo, N. Y., for the past 11 years, has been appointed superintendent of the factory of the Pathfinder Co., Indianapolis, Ind.

G. N. Thurber, vice president of the Osotta-Fraschini Motors Co., New York, and one of the designers of the Navara car, which made its debut at the Salon in New York last January, died in that city on May 6. His death was caused by heart trouble. He was in his 31st year.

The Prest-O-Lite Co., Inc., announces the following list of battery service stations appointed for the week ending May 19: The Como Motor Car Co., Main St., Como, Miss.; G. H. Himes, 1405 14th St., N. W., Washington, D. C.

The Kissel Motor Car Co., Hartford, Wis., has recently appointed the following as Kissel Kar agencies: Joseph Wood, Burley, Idaho; N. D. Key, Idaho Falls, Idaho; Alfred Wallace, 1714 Senate St., Columbia, S. C.; John H. Howard, Decatur, Ill.; Frank Davis & Sons, Danielson, Conn.; J. F. Charley Auto Co., Evansville, Ind.

James H. McConnell, formerly with the S. F. Bowser & Co., and recently with the Wayne company, has taken charge of the sales department of the Shotwell Pump and Tank Co. of Indianapolis. The Shotwell company, which is rapidly de-



Edwin B. Jackson, Elected as a New Vice President of the Willys-Overland Co., Toledo, O.

veloping an extensive selling organization, manufactures a complete line of measuring pumps and storage tanks for garages, factory, railroad and mercantile use.

The Russel Motor Axle Co., Detroit, Mich., has placed its employees on a bonus system which will net each worker who qualifies under the conditions of the plan an additional 10 per cent. of his monthly wages. The company makes an internal gear drive unit for motor trucks and the demand for its product has increased so rapidly that facilities at the factory have proven inadequate to keep production up to the sales. On account of this situation and other reasons the management decided to institute a bonus system and President A. W. Russel in making the announcement says that the company desires to provide an incentive to employees for steady and continuous work. Payment of bonuses is subject to the approval of the department foremen under whom the employee is working. Starting Feb. 1, 1917, 10 per cent. of the monthly wages of each employee will be credited to him and payment of this bonus will be made every three months, beginning Aug. 1, 1917. In other words, on Aug. 1, 1917, there will be paid as an extra remuneration to all who have qualified, 10 per cent. of the wages for February, March and April, and on Nov. 1, 1917, 10 per cent. of the wages for May, June and July. Employees who show proof of enlistment in the army, navy or marine corps will be entitled to their bonuses up to the time of their leaving the employ of the Russel company. In case it should be necessary to lay off employees because of lack of work, the full bonus up to the time of discharge will be paid, provided the employee has worked steadily for the best interests of the company.

C. H. King, vice president and general manager of the Chalmers Sales Co., Inc., New York branch of the Chalmers Motor Co., it is announced, opened the new



C. H. King, Vice President and General Manager of the Chalmers Sales Co., Inc., New York City.

branch headquarters this month at 1826-28 Broadway.

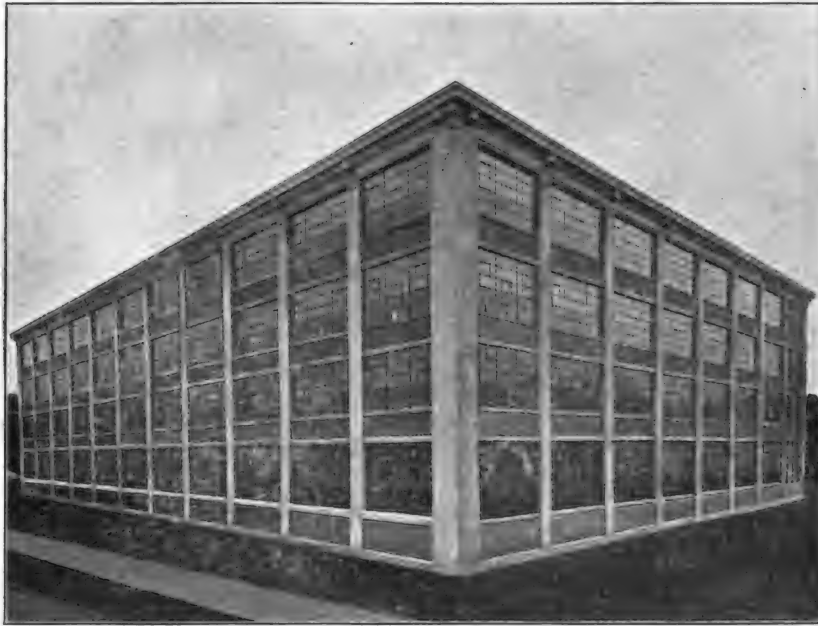
The Willys-Overland Company directors, following the annual meeting recently, re-elected John N. Willys president and elected the following vice presidents: C. A. Earl, H. L. Shepler, Isaac Kinsey, James E. Kepperley and Edwin B. Jackson. Mr. Jackson joined the Willys-Overland organization last summer.

The Metz Motor Car Co., Waltham, Mass., has received an order from the Auto Trading Co., Pittsburg, Penn., for a car load of Metz cars to be shipped every day. The Metz cars have become very popular in the mountainous sections of Pennsylvania, owing to their ability to negotiate hills and rough roads with great ease.

The King Motor Car Co., Detroit, Mich., has announced a new price schedule, which went into effect on May 14. The prices are: Roadster, \$1585; touring car, \$1650; foursome, \$1700; sedan, \$2300. These prices are f. o. b. Detroit and only cover standard cars. Wire wheels are \$100 net additional.

The Fold-O-Lock Steering Wheel Co., capitalized for \$250,000, will erect a \$50,000 factory at Wichita, Kan., to manufacture the device that locks the car when the steering wheel is folded down against the steering post. The company will also manufacture an automatic radiator top and automatic tire pump. The officers of the company are: C. A. Hagberg, president and general manager; Carl L. Windberg, vice president and sales manager, and F. L. Fraser, secretary and treasurer.

The Maxwell Motor Company has declared the regular quarterly dividend of 2½ per cent. on the common stock, payable July 2 to stock of record June 11. It is reported that the April earnings of the company were the largest on record and that the net for the fiscal year ending July 31 will exceed \$5,000,000. At present 350 cars are being turned out



The New Departure Mfg. Co., Bristol Conn., New Steel Ball Plant, the Only Structure in the World Housing Equipment Where Steel Balls Are to Be Produced from Raw Material Complete to Finished Product.

daily and the total for April was 7900. Production for the year is estimated at 80,000 cars, as compared with 60,000 cars last year.

The Keystone Tire and Rubber Co. made net earnings for the month of April amounting to approximately \$75,000. The month was the best in the company's history, although the earnings for the present month will exceed the record if maintained at the present rate.

The Chandler Motor Car Co., Cleveland, O., has declared the regular quarterly dividend of two per cent. and the usual extra quarterly dividend of one per cent. A report read at the directors' meeting showed that there was an increase in business in the period from Jan. 1 to April 30 this year of 134 per cent. over the corresponding period in 1916, and an increase in profits for the period of 182 per cent.

The Pierce-Arrow Motor Car Corp., Buffalo, N. Y., has declared an initial dividend on its common stock of \$1.25 a share. The usual quarterly dividend of \$2 a share on the preferred stock has also been declared. For the four months ending April 30 last, after deducting all expenses and accrued taxes, except taxes on excess profits, the earnings were as follows: Net operating profits, \$1,502,833; less interest, \$5257; profits before depreciation, \$1,497,576; depreciation, plant and equipment, \$156,444; net profits, \$1,341,132.

The New Departure Manufacturing Co., Bristol, Conn., has just completed and will soon open its new ball plant, a commodious, thoroughly designed building four stories high, of reinforced concrete construction, which has a total floor space of 178,000 square feet, or nearly two acres. The new ball plant, it is asserted, is the largest of its kind in the world, and, as a building is notable, housing complete equipment for the man-

ufacture of steel balls in every operation from the raw material to the finished product.

Edward V. Hartford, Inc., in addition to an extensive national advertising campaign, covering the great circulation of the metropolitan dailies, the leading weekly and monthly magazines and trade journals, reaching 30,000,000 readers, will also use a 25 set locality proposition. This is a strong appeal to dealers to handle the Hartford equipment as the demand has been created for the article in every city, town or village.

The Dixie Motor Car Co., Louisville, Ky., has issued a new price schedule, which becomes effective on June 1. After that date the prices of the Dixie Flyer model L, series three, will be as follows: Five-passenger touring car, \$895; four-passenger roadster, \$895; five-passenger convertible sedan, \$1295. All prices are f. o. b. factory.

Walter F. Sheehan has been appointed general manager of the Globe Motor Truck Co., St. Louis, Mo., and C. T. Schaefer, formerly chief engineer of the Mogul Truck Co., has joined the company in a similar capacity. The Globe Motor Truck Co. is now producing a full line of one, 1½ and two-ton trucks.

The Goodell-Pratt Co., tool makers, Greenfield, Mass., are having a large addition erected to the machine shop, which is now nearing completion. The new building, the total cost of which will approximate \$135,000, will be four stories high and of reinforced concrete construction throughout. It is to be 58 by 260 feet, with a four-story ell 58 by 110 feet. This will increase the floor area of this growing concern by about 86,072 square feet. In the construction, columns of mushroom type, 24 inches in diameter, are used for the basement, columns 22 inches in diameter for the first and second floors and 16 inch columns for the third and top floors.

The Mutual Motors Co., Jackson, Mich., makers of the Marion-Handley, have completed arrangements with Spayer, Cole & Co. of New York to handle the territory of Java as distributors, and will ship two car loads of Marion-Handleys immediately. At a special meeting of the board of directors of the company George E. Drawe, assistant general manager, was elected to the directorate and made treasurer of the company, to succeed W. T. Miller, who has resigned.

The Lavine Gear Co., Racine, Wis., will triple its production schedule upon completion of the new addition to the plant, foundations for which have already been installed.

Ralph Kaye has been appointed manager of the advertising and publicity department of the Kissel Motor Car Co., Hartford, Wis. He was formerly connected with the Otto J. Koch Advertising Agency of Milwaukee and handled the Kissel Kar publicity while there.

The Jenkins Vulcan Spring Co., St. Louis, Mo., has increased its capital stock from \$60,000 to \$200,000. At headquarters and the four branches, Minneapolis, Reading, Penn.; Fort Worth, Tex., and Sumter, S. C., the company carries in stock a total of 90,000 replacement springs, covering 588 separate and distinct types for all popular priced cars.

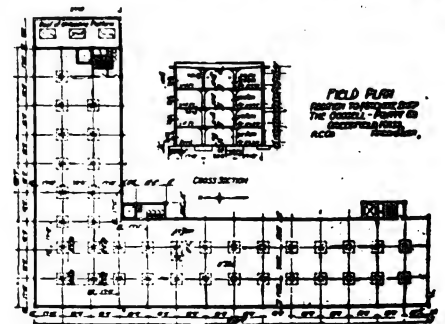
W. Owen Thomas and T. R. Thomas have organized the firm of Thomas & Thomas, engineering specialists in the automotive industry, and have established a laboratory in the Garfield Bldg., 864 Woodward Ave., Detroit. Prior to the outbreak of the European war the firm of Thomas & Thomas had offices in New York and London and acted as consulting engineers for many of the leading automobile manufacturers of the world.

The Connecticut Auto Mfg. Co., Bridgeport, Conn., will build a new factory, 70x128 feet.

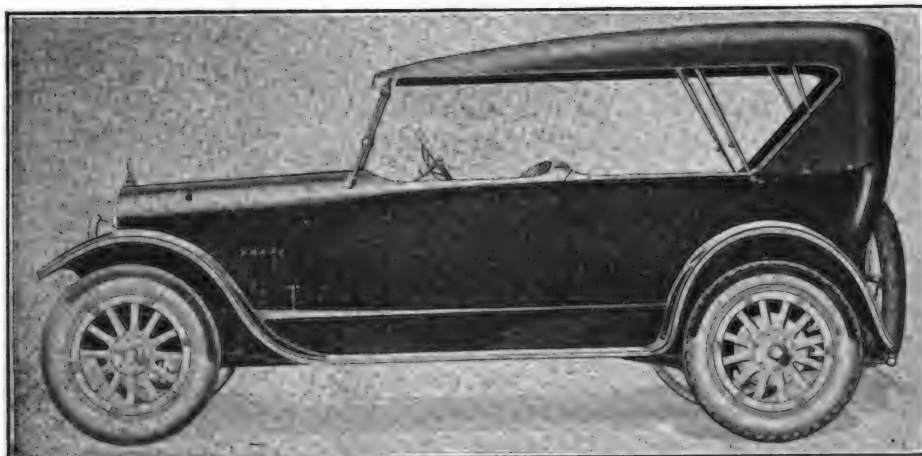
The Canton Motor Co., Canton, O., has offered the use of the roof on its plant to the 10th Ohio regiment for drilling purposes.

The Lumb Motor Truck and Tractor Co., Aurora, Ill., turned out the first model of its two-ton truck last week. The truck is equipped with a Buda motor rated at 37 horsepower, with a number of new features.

The Champion Ignition Co., Flint, Mich., has placed an order for automatic screw machinery amounting to \$50,000.



Floor Plan Addition to the Goodell-Pratt Co. Factories, Greenfield, Mass.



Abbott Six-Cylinder, 60 Horsepower Touring Car, with Continental Motor, All Metal Body, Mahogany Cowl. Priced at \$1595.

ABBOTT ANNOUNCES NEW MODEL

Car To Make Debut From the Company's New Plant at Cleveland, Ohio

The Abbott Corporation, makers of the Abbott car, having recently transferred its plant from Detroit to Cleveland, O., has announced a new model, a six-cylinder car of 60 horsepower, which will be marketed in the near future.

The new car, which will be known as the "6-60," and which will sell for \$1595 for the touring car model, will stand out prominently among the other sixes now on the market. A Continental motor is used with a Warner transmission. An all-metal body of special design, with mahogany cowl, genuine leather upholstery, nicked copper instruments, distinguishes it as to appointments.

The new factory in Cleveland is located at East 152nd street, in the new industrial district, in the same section with the Holt, Chandler and Grant Motor Car companies and the Torbenson Axle Company. The shops have 70,000 square feet of floor space in one building, 725 feet long and 125 feet wide. In addition to the factory site the company has six acres of land for expansion, with a protective option on 13 more acres.

Alfred Thompson, formerly production manager of the Hudson Motor Car Co., and a pioneer in the automobile industry, heads the new organization, and D. L. Gardiner is vice president. A. W. Gardiner is secretary-treasurer, Fred Berger chief engineer and W. G. Clay sales manager.

An advance of \$100 has been made in the price of the 6-44 model Abbott touring car and \$45 in the price of the 6-44 clubster, making the price of both models the same, \$1295, which price becomes effective after May 25.

WOMAN EASILY DRIVES 12-CYLINDER PATHFINDER.

Miss Nellie D. Prendergast of the publicity department of the Pathfinder

company, is an accomplished driver and one of the woman drivers who can handle a 12-cylinder "Pathfinder the Great" with ease and expertness. She is a devotee of out of doors enjoyment and when released from a strenuous day in the office pilots her 12-cylinder with much satisfaction over Indiana highways.

From her direct experience as a driver the merits of the model are incorporated in the variety of publicity matter with which she has to do. This familiarity with the subject is only one trait of Miss Prendergast's versatility. She is well versed in the business side of the industry, and, on the whole, just the sort who would accept the piloting of a 12-cylinder car as an incident, although, to the average motorist, a woman at the wheel of a big 12-cylinder car appeals in itself as considerable of a feat. However, she asserts the Pathfinder the Great has such flexibility that its operation is simple.



Miss Nellie D. Prendergast, Publicity Department the Pathfinder Company, Indianapolis, Ind.

COMING EVENTS

AUTOMOTIVE MEETINGS.

Society of Automotive Engineers, summer meeting at Washington, D. C. June 25-26

AUTOMOBILE RACES.

Walla Walla, Wash., Track May 26
Uniontown, Penn., Speedway May 30
Chicago, Ill., Championship, Speedway June 9
Cincinnati, O., Speedway June 23
Omaha, Neb., Championship, Speedway July 4
Spokane, Wash., Track July 4
Tacoma, Wash., Speedway July 4
Uniontown, Penn., Speedway July 4
Visalia, Cal., Road Race July 4
Benton Harbor, Mich., Track July 4
Des Moines, Ia., Speedway, Championship July 14
Rochester, N. Y., Hill Climb July 14
Minneapolis, Mont., Track July 15
Buffalo, N. Y., Intercity, Road July 17-19
Anacosta, Mont., Track July 22
Tacoma, Wash., Championship, Speedway July 23
Great Falls, Mont., Track July 29
Kansas City, Mo., Speedway (dirt) Aug. 4
Billings, Mont., Track Aug. 5
Elgin, Ill., Road Race Aug. 18
Spokane, Wash., Interstate Fair, Sept. 2-9
Cincinnati, O., Championship, Speedway Sept. 8
Red Bank, N. J., Track Sept. 8
Pikes Peak, Col., Road Climb Sept. 8
Milwaukee, Wis., at State Fair Park Sept. 9-15
Providence, R. I., Championship, Speedway Sept. 15
Allentown, Penn., Track Sept. 22
Trenton, N. J., Track Sept. 23
New York, Sheepshead Bay Speedway, Championship Sept. 29
Uniontown, Penn., Speedway Sept. 29
Kansas City, Mo., Speedway Oct. 6
Uniontown, Penn., Speedway Oct. 6
Danbury, Conn., Track Oct. 6
Chicago, Ill., Speedway, Championship Oct. 13
Richmond, Va., Track Oct. 13
New York, Sheepshead Bay Speedway Oct. 27

SHOWS AND CONVENTIONS.

Montreal, Can., used car show, Coliseum June 20-27
Spokane, Wash., Interstate Fair, Sept. 2-9
Milwaukee, Wis., State Fair Sept. 9-15
Dallas, Tex., Dallas Automobile and Accessory Dealers' Association, State Fair Oct. 13-23
Washington, D. C., Carnival and Open House Week, Automobile Trade Association of Washington Jan. 11-18



MEASURING WITH CALIPERS.

(Figure 371.)

Accurate measuring of odd shaped pieces of iron, cylinder walls, flywheels, etc., frequently present difficult problems to the automobilist. With an ordinary pair of calipers the measurement may not be taken because after it has been found the calipers cannot be removed on account of projections in the casting without changing the measurement. The illustration shows calipers in two positions, the first as set to take outside dimensions, the second as set to take inside measurement. It will be noted that upon the sides of the calipers are punched at A and B two dots. After the calipers have been put into position the distance between A and B is accurately measured, the calipers removed, then set back so that the distance between A and B is the same as it was when on the piece. The distance between the ends may then be measured.

OIL GAGE.

(Figure 372.)

The operation and life of an engine is dependent upon proper lubrication. Hence, if the oil level is allowed to drop below that for which it is designed, many troubles are bound to develop and the engine may be badly damaged. Many of the cars now in use are not equipped with oil level gages and the operator is dependent upon judgment, or is forced to put in oil until the engine begins to smoke. The evil of carbonization is then apt to develop. It is not a hard job to make an oil indicator which is positive in action yet does not contain glass parts which are easily broken. Procure a length of $\frac{1}{8}$ inch brass pipe about six inches long, a piece of $\frac{3}{4}$ inch pipe six inches long, a $\frac{3}{4}$ inch pipe cap, a reducing elbow $\frac{3}{4}$ by $\frac{1}{8}$ inch, a piece of cork trimmed to $\frac{5}{8}$ inch diameter and a round piece of wire or wood for an indicator. This material is assembled as is shown in the illustration, A, the $\frac{1}{8}$ inch pipe is screwed into the engine base at such a point below the oil level as to permit the oil to rise into the $\frac{3}{4}$ inch pipe, B, about half way to the top. The cork float, C, is fastened to the indicator wire, D, and placed in the pipe cap, E, through which is bored a hole just large enough to allow the indicator wire to slide easily through it. After the correct level is once found, and a mark made upon the

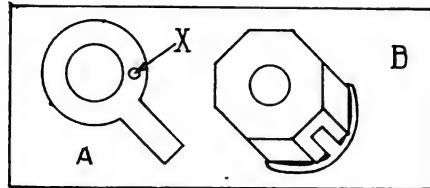


Fig. 369—Nut Locking Device.

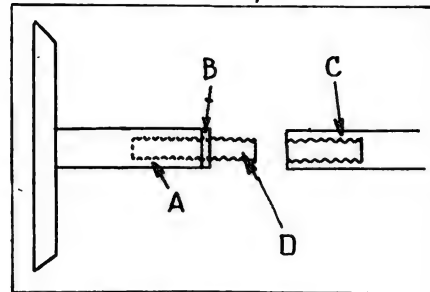


Fig. 370—Valve Repair.

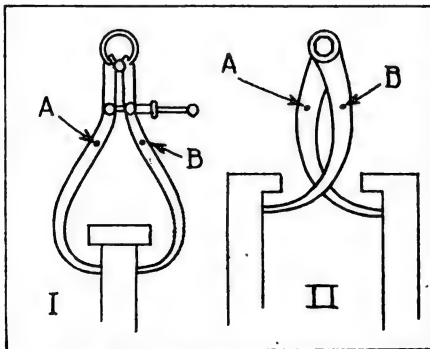


Fig. 371—Caliper Casting.

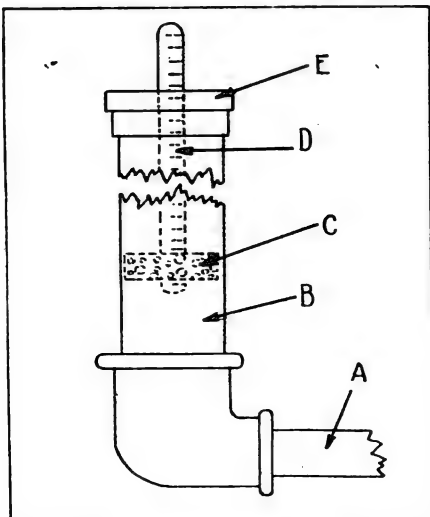


Fig. 372—Oil Gage.

indicator, it is an easy matter to tell at a glance just how much oil is needed and how much there is in the engine base. This oil height indicator is positive acting for the reason that if at any time the pipe, A, should become clogged, a pumping motion upon the indicator, D, will force out the obstruction. The cost is simply a very small premium for engine damage insurance.

LOCKING NUTS.

(Figure 369.)

Due to continued vibration and strain, the bolts and nuts on an automobile have a tendency to loosen unless locked by some device to prevent their turning. Grave accidents have often happened and the cause traced to a loose nut or bolt. Important nuts are usually locked by lock nuts, split washers, or heads, pins or castellated nuts with cotter pins. An easy method of locking nuts into place is by cutting a piece of iron or tin into the shape illustrated at A, the large hole in the centre slipping over the bolt, the small hole X fitting over a small pin, which is driven into the piece to be bolted. After the tin has been put into place and the nut screwed down the flap on the tin is bent upward and against the nut, thus preventing the nut from jarring loose, the pressure of the nut holding the pin which passes through X into place.

VALVE REPAIR.

(Figure 370.)

Though a broken valve should be replaced at the earliest opportunity, it frequently happens that such replacement is not convenient and, therefore, it is necessary to make a temporary repair. A method by which two things are accomplished and is often used is illustrated herewith. Square off the broken ends of the valve with a grinding wheel, or file, and tap into each for a depth of about $\frac{3}{4}$ of an inch, as shown at A and C. Insert the threaded piece, D, which may be made by cutting off the head of a machine screw. Now fit a small washer over the screw, as shown at B, to compensate for the filed or ground off portion, and screw on the end C. Not only is this a repair job, but valve stem adjustment is made possible. By varying the thickness of the washer B the length of the valve stem may be either in-

creased or diminished and proper adjustment maintained.

WHEEL PULLER.

(Figure 375.)

For some time after a wheel has been in place on a car it becomes a problem to remove it without marring or completely spoiling the finish by pounding it. Many of the present day cars are fitted with hub caps, which are screwed to the wheel hub, and most owners carry an extra cap on hand or have one that is dented or unsightly. Such a cap may be used with good results for removing stubborn wheels. Bore a $\frac{9}{16}$ inch hole through the top of the cap and through it (A) insert a $\frac{1}{2}$ inch machine screw. On the inside of the cap and upon the machine screw place a nut (B). After all of the retaining nuts, keys, etc., have been removed and the remodeled hub cap put into place the wheel may be forced off by screwing up upon A. In extreme cases where the wheel sticks particularly hard it should be jarred by hitting it with a heavy mallet, or piece of wood, after the screw A has been turned down so as to bring pressure upon the shaft.

MUFFLER CUT OUT.

(Figure 376.)

Though but little power is gained by cutting out the muffler and open mufflers are prohibited on the highways in many states, it is often a great help for testing out the engine, as the noise is increased and individual explosions are more distinct. Cut outs are being dispensed with upon many of the new model cars. Should any of the readers desire to place a cut out on his car the process is simple and inexpensive. The parts required may be obtained in practically any hardware store or at any plumber's. They are assembled as shown in the diagram and consist of: A pipe T, as shown at D, to which is fastened the engine exhaust pipe, A, and the muffler pipe, B. One side of the T is drilled for a $\frac{3}{8}$ inch carriage bolt, F, which passes through the T and extends through the floor about one inch. A nut on the end of the bolt serves to hold the washer, E, into place against the open end of the T.

The spring C fits over the bolt, presses against the pipe T and is held into place by a washer and pin passing through the bolt. When pressure is applied to the bolt head the passage is opened by the exhaust pressure.

STEERING GEAR REPAIR.

(Figure 374.)

As the steering gear cap is screwed on to the steering gear internal gear case of the Ford car with very fine threads, these frequently wear to such an extent as to allow the cap to slip from the case. Should this happen on a rough road, or when the car is traveling at a rapid pace, there is grave danger, as the operator is unable to govern the wheels. Such an important part should be examined frequently and if wear develops should be immediately attended to. The illustration shows an easy method for repairing this part. Screw or put the cap upon

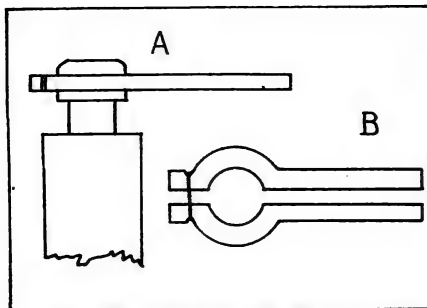


Fig. 373—Radiator Cap Remover.

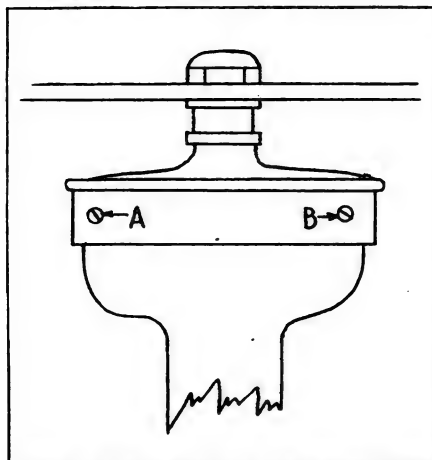


Fig. 374—Steering Gear Repair.

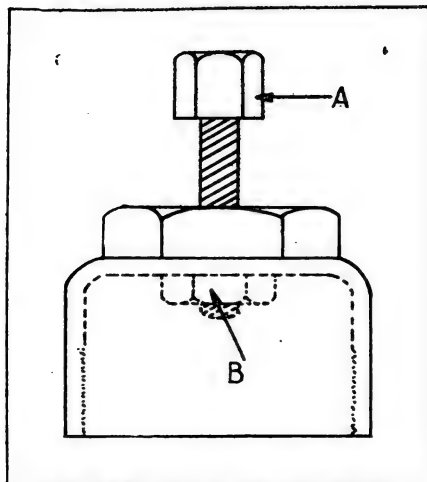


Fig. 375—Handy Wheel Puller.

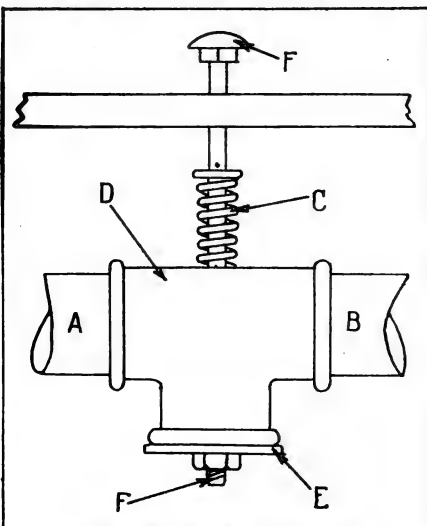


Fig. 376—Muffler Cut-Out.

the case as far down as it will go. There at two or three points in the circumference bore an eighth inch hole and tap for a machine screw. The machine screw should not be so long as to interfere with the action of the steering gears in the housing, but long enough to screw into the case. So long as these screws are in place it is impossible to remove the cap, and the condition of this part may be found very easily by inspection.

RADIATOR CAP REMOVER.

(Figure 373.)

Owing to corrosive action of warm water and air, radiator caps frequently stick so hard as to make their removal very difficult without scratching the finish. Procure two pieces of hard wood about $\frac{3}{4}$ inch thick and cut them into the shape as illustrated at B. Make a loop of iron wire just large enough to slip over the short ends of the wood and into the slots. The device may be used on the brightest finish without leaving a mark. Sketch A shows the device as applied to remove a radiator cap.

REPAIRING PINHOLE PUNCTURES.

One of the causes for tire failure can be traced to tread separation from fabric due to water seepage between the layers through small cuts or punctures. Tires should be examined frequently for such small holes and when found breaks should be immediately repaired. If the break is small, clean it thoroughly with gasoline, cutting away ragged edges. The hole should then be filled with cement and allowed to dry. More cement should then be applied and a piece of soft rubber forced into the hole and clamped into place. After it has dried, smooth off, after which the heat of frictional contact with the road will complete the job.

SPRING LUBRICATORS.

(Figure 377.)

The life of car springs may be materially lengthened, the riding qualities of the car improved and many squeaks eliminated by keeping the springs well lubricated. Each spring should be kept oiled by using a device upon it as illustrated. With two bolts fasten a piece of brass or thin wood strip upon each side of the spring, placing a thin strip of felt between the device and the spring leaves. Apply a sufficient quantity of oil to the felt strip to saturate it and run the oil along the leaves where they contact. The felt forms a sort of reservoir and the oil is fed to the spring leaves in small quantities by capillary action.

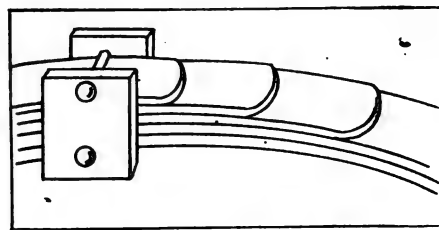


Fig. 377—Spring Lubricator.

Sustain Objections to Automobile Tax

Vigorous Protests from Business Men and Owners Requisite in Support of Modification Plans Secured on the First War Revenue Measure

THE protest of the automobile industry against the proposed five per cent. war revenue tax upon it is no less highly important to the owners and the general public than to the manufacturers and dealers. Representatives of the industry had only 40 minutes to present its objections to the Senate Committee on Finance, resulting, nevertheless, in rejection of same by the Senate and the projection of a number of substitutes for the House levy on the automobile industry. Until the matter is settled finally and the placement of a just tax decided, a condition of instability confronts all concerned. The revenue raisers, it is understood, are considering as a substitute for the automobile manufacturers tax a flat, graduated annual tax upon machines, ranging from \$2 to \$25, whether in possession of manufacturers, distributors or individuals.

That the campaign of the National Automobile Chamber of Commerce and men identified with the industry against the five per cent. clause was successful, while a subject for congratulation, does not mean the conclusion of the whole matter. Remonstrances to this tax, or to the shifting of it inequitably, are still quite in order. No plan which would place the burden on production alone, the equivalent of putting it on the new car buyer, will do. The later plans, understood to be approved in the motor industry, would amount to a distribution tax on profits and on every owner of a motor car for his proper share. This is looked upon as a logical substitute for the original form of taxation.

With the allied industries 915,000 persons are employed and approximately 2,700,000, or nearly three per cent. of the population, are dependent upon automobile building and operation, according to the brief submitted in the hearing by General Manager Reeves of the N. A. C. C., of which a very complete text was printed in the last issue of the Automobile Journal.

The industry and car owners are a unit against unfair taxation. There is every reason to believe that many future war measures may need be expected.

THE AUTOMOBILE INDUSTRY

The following statement, which shows many important facts that could not for obvious reasons be included in the brief, was presented by General Manager Reeves as a supplement to it. This gives general information, necessarily dealing in totals only, and, after showing the proportions of the industry, the number of individual interests, has some figures of the other industries allied with it. In addition it contains some facts relative to profits that indicate that the number of failures have largely exceeded the successes, and the average percentage of profit made is small when compared with other enterprises. The utility of automobile ve-

hicles is indicated by totals, but the significance of these can hardly be grasped.

Automobile and motor truck plants.....	469
Body, parts and accessory plants.....	825
Automobile and truck dealers.....	26,924
Garages.....	22,863
Automobile machine shops.....	12,171
Exclusive automobile supply houses.....	2,500
Total establishments dependent on the industry.....	66,448
Wage earners employed in the industry.....	915,000
Total dependents upon the industry.....	2,700,000
Passenger cars manufactured in 1916.....	1,493,000
Commercial vehicles manufactured in 1916.....	90,676
Average wholesale value of passenger cars produced in 1916.....	\$875
Motor vehicles registered in U. S. on Dec. 1, 1916.....	3,541,728
Estimated commercial cars in use.....	300,000
Estimated percentage of cars owned by farmers.....	40
Proportion of cars in Iowa to population.....	1 to 12
Proportion of cars in Nebraska to population.....	1 to 13
Proportion of cars in New York to population.....	1 to 37
Increase in registration in Oklahoma in 1916, over 1915.....	103%
Increase in registration in Nevada last year.....	111%
Increase in registration in Georgia last year.....	90%
Increase in registration in North Carolina.....	65%
Increase in registration in New York State.....	31%
Increase in registration in Connecticut.....	25%
Increase in registration in Illinois.....	28%
Total registration and other state fees paid by motor vehicle owners in 1916.....	\$28,889,167
Percentage of cars produced in 1916 by 12 largest companies.....	80%
Percentage of cars produced by 438 companies.....	20%
Passenger cars exported in 1916.....	61,941
Motor trucks exported in 1916.....	18,903
Value of 1916 exports.....	\$96,595,861
Motor vehicle companies that failed or went out of the business in last five years.....	718
Companies that failed since October, 1915.....	183
Average percentage of profit made by automobile manufacturers last year.....	12%
Ratio of 5% tax to average profit of most prosperous companies.....	5/12ths or 41.6%
Percentage of advertising appropriation to total sales in automobile trade.....	2%
Increase in cost of labor during last two years.....	25%
Increases in costs of material in last two years.....	30 to 400%
States in which automobile plants are located.....	32
Number of different parts bought by motor car makers.....	465
Ton-mile service rendered by 300,000 motor trucks in 1916.....	4,500,000,000
Value of motor truck service in 1916 at railroad rate of 7/10 of a cent per ton-mile.....	\$81,500,000
Value of motor truck service at average rate of 20 cents per ton-mile for road haulage.....	\$900,000,000

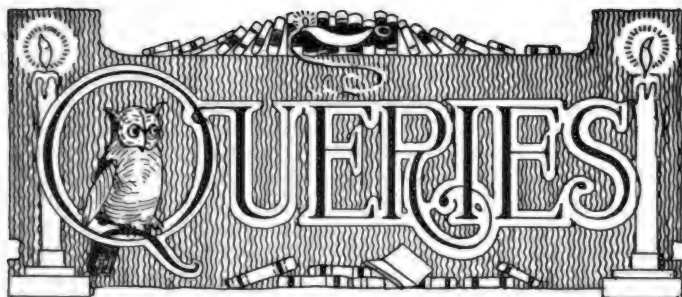
FURTHER EXTRACTS FROM BRIEF.

The following are additional extracts from the brief in the form presented to the Senate:

The automobile industry is anxious to supply its share of revenue to the government and feels that with a fair chance to do business and to keep its industry stable, it can supply a substantial amount. If the volume of trade falls off, however, this result will be disappointing.

The dealer's position in connection with this tax warrants careful consideration. He maintains salesrooms, under lease, with certain fixed expenses all dependent on the sale of certain types of motor car. If a dealer cannot obtain cars from his own company he suffers a loss, because most other lines are represented in his own city and he is left with nothing to sell.

Reports show that not more than half of the motor car dealers are making more than a living.



NOTICE TO READERS.

THIS department contains the Mechanical Editor's answers to readers' inquiries. It is open to every subscriber. If any part of your car is not operating satisfactorily, or if you desire information regarding operating, maintaining or repairing motor cars, do not hesitate to lay your troubles before him. He will answer promptly and fully, either by mail or in these columns, as you direct. This service is free to every subscriber, and is often the means of saving considerable money that otherwise would be spent with a garage man. Letters should always be signed with the writer's full name and address, and the car or part in question should be properly identified, by mentioning the maker's name, model, year of production or other distinguishing feature. Address all inquiries to the Mechanical Editor.

THE AUTOMOBILE JOURNAL IDEA EXCHANGE.

For the benefit of readers of the Queries column it has been decided to conduct in this department a more widespread interchange of ideas. To this end the attention of readers is invited to the following question:

IN PURCHASING A USED CAR WHAT TESTS WOULD YOU MAKE AND WHAT CONDITIONS WOULD YOU LOOK FOR?

To the writer of the best answer to the above question \$2.50 will be paid. The best answer received will be published in the second issue after the appearance of the question in the magazine. Answers to the question should be in the hands of the editors by the 18th of June. The contest is open to every subscriber.

MAXWELL WIRING SYSTEM.

(A. L. G., Holyoke, Mass.)

I have a Maxwell 25, 1916 car. The lights were all right until I put in the starting switch, then they all burned out. What is the trouble?

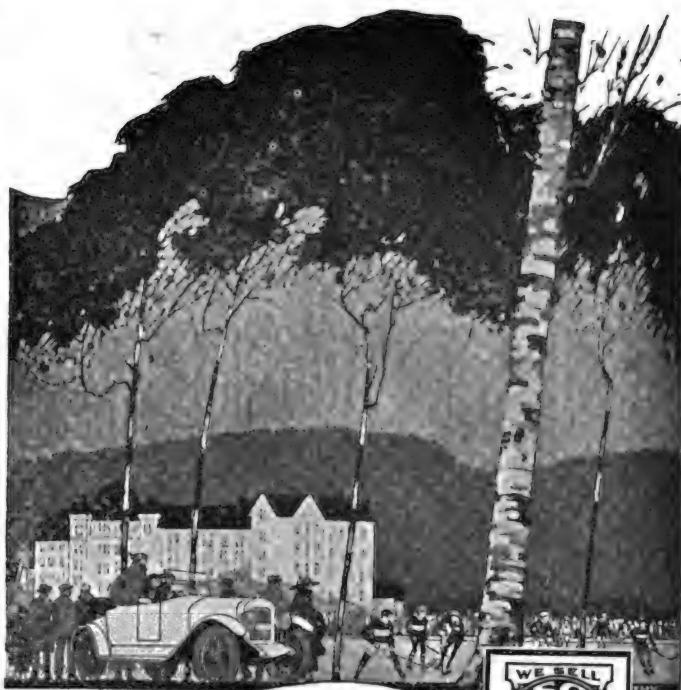
Published herewith is a wiring diagram of the electrical system on your car.

First, carefully compare the wiring diagram with the connections on the car and see that the wires are in their proper places and that all binding posts and connections are tight. Then go over all of the wiring system, especially at such points where wires pass through holes in the frame, dash, etc., and be sure that the insulation is not worn from the wires or that two parallel wires do not contact with each other.

Trouble is probably due to the fact that there is a "short" or ground connection at some point in the installation. The test for such trouble is a long one and requires care and patience. We would suggest that you take the car to a service station and have the trouble located if you do not find it by inspection as directed above. If you have the time and care to bother with it, the following method of testing may assist you to locate it.

Disconnect the wire attached to terminal 12, in the diagram, at the battery and to the battery terminal connect a wire to one terminal of a socket in which is placed a six volt bulb (a bulb from the headlight will do), to the other terminal of the socket attach a long insulated test wire (about No. 14 B. & S gage). You now have a testing outfit for finding grounds in the wiring system, as you will find that, upon touching the test wire to the frame, the test lamp will be lighted.

(When Writing to Advertisers, Please Mention The Automobile Journal.)



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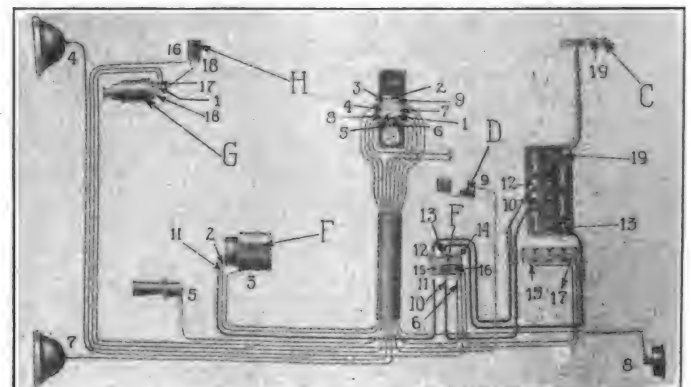
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All of the wiring must now be carefully gone over for "grounds" as follows. Disconnect the other end of No. 12 wire (at the starter switch). This wire should now be "dead" or disconnected from the rest of the system. Touch either end with the test wire. If the test light burns it is an indication that wire No. 12 is grounded to the frame at some point between the battery and the starter switch and your trouble is located. If it does not burn, put back the terminal on the starting switch, making sure that the contact is good and clean, and that the binding post is tightly screwed down. Now disconnect wire No. 10 at both the battery end and the starter switch. Touch either terminal with the test wire. If a ground is not found reconnect and proceed to test every wire in the same way. Wire No. 3 for instance would be disconnected at the dash panel and at the motor generator ends. No. 2 the same. No. 11 at the motor generator and starter switch and so on. In testing wires seven, four and eight, disconnect at the dash panel and remove light bulbs. During all of the tests wire No. 12 must be left disconnected from the battery. By this means you will be able to locate any wire that may be contacting with the ground or frame.

Next comes the possibility of a "cross circuit" or the contact of one wire with another. The detection of this trouble is slightly more difficult, but the procedure is somewhat the same. With the test lamp still connected with battery terminal 12, disconnect wire 19 from the other battery terminal, and with this terminal connect a length of wire the same as used for the test wire on the lamp. For the sake of convenience let us call this wire B and the test wire from the lamp A. Disconnect wire 12 from the starting switch and connect it with test wire A, then, beginning with wire one



Maxwell Wiring Diagram: C, Frame; D, Regulator Shunt Contact; E, Starter Switch; F, Motor Generator; G, Magnetoelectric; H, Magnetoelectric.

at the magnetoelectric, or dash, touch a terminal of every wire (two, three, four, five, etc., at the dash) and note whether the lamp is lighted or not. If it is lighted, then it is an indication that there is a "cross connection" between wire No. 12 (which should be "dead") to whichever wire is touched when the light is lighted. Do the same with every other wire as you have done with wire 12.

Both of the above tests may be carried along together in order to simplify matters and avoid the necessity of disconnecting the terminals so many times. We have taken the tests up separately, however, in order to make them clear. As you go along more tests will occur to you and we do not doubt that with these directions and with the aid of the test lamp you will be able to locate the trouble, if you have the necessary patience. It is very probable that the trouble will be located in either wires leading to battery or starting switch.

CADILLAC DISTRIBUTOR. (S. M., Detroit, Mich.)

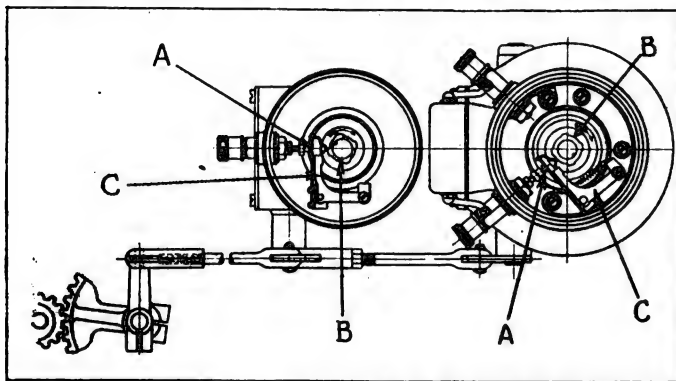
I have a Cadillac car of the year 1913 and would like to know about the battery and magnetoelectric timers with reference to the proper setting of the breaker points. Should the adjustment of both be the same? There seems to be some sort of automatic spark advance arrangement on this car. Does this take care of the spark advance and is there need to bother with the hand control?

The magnetoelectric distributor and timer on the Cadillac car is located on the right side of the engine (facing the front).

near the front, and like the battery distributor and timer is one unit, both the timer and distributor being operated by the same shaft. The action of both of these units is the same with the exception that the battery timer is not automatically advanced. The cut herewith illustrates the construction of the timers and the operation is as follows: As the timer shafts revolve (at half crankshaft speed) the cams, B, turn in the direction of the arrows. The contact arms, C, rise on the lobes of the cams and contact is made at the points, A. As the cams turn further this contact is broken and a spark is caused in the secondary coil. The distance between the contact points should be .015 of an inch and should be adjusted when the contact arm is riding about half way between the timer lobes. This distance is the same in both magneto and battery timer.

The magneto timer is equipped with an automatic system for advancing the spark with the increase of engine speed. A hollow shaft with a helical slot (slanting slightly across the centre line) transmits motion to the timer. Fitting inside this shaft is a smaller shaft, which is slotted lengthwise and is driven by the engine gears. Surrounding this shaft assembly is a collar which may slide upon the timer shaft tube. A pin passes through both the helical slot and the lengthwise slot and is fitted into the outside collar. It will be seen that as this outside collar is raised or lowered upon the shaft the relation between the shaft driven by the gears and the timer tube shaft is changed by the traverse of the pin, resulting in an advance or retardation of the spark timing. The position of the collar is governed by a centrifugal device, which acts automatically with the change of engine speed.

When the car is being run on the magneto the spark ad-



Battery and Magneto Timer Boxes on Cadillac Car.

vance may be controlled either manually or automatically and there is no necessity for changing the setting at the hand control.

SINGLE AND DOUBLE WIRE SYSTEMS.

(F. K., Cincinnati, O.)

Will you please answer the following questions? Why do manufacturers use the grounded system on their generators instead of the double wire system? Are single and double wire generators constructed the same? Can a double wire generator be wired as a single wire system by grounding one pole?

Practically speaking, the advantages of one system of wiring over the other is largely a matter of preference and there are arguments for and against each.

The single wire or grounded system to a certain extent is more convenient for wiring, in that less wire is needed, since the frame forms one side of the system, and to it can be connected one terminal of all electrical fixtures. The construction and operation of generators in both systems are the same, though, with the single wire system, connections of both the generator and motor are simplified, in that these units may be grounded in themselves, leaving but one side of the circuit to be taken care of by wire. By the use of this system there is not the "jumble" or confusion of so many wires as there are in the two or multi systems which require a return wire for every fixture. With this system there is a certain disadvantage, in that there is always the danger of short circuits developing from chafing of insulation from

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wires. Then, too, the return circuit through the frame or ground is not always of the best because of liability of rust or corrosion at frame joints. This latter trouble may develop to such an extent as to cause complete insulation and the entire isolation of parts of the frame or fittings.

Advantages in favor of the two-wire system are that a positive return is always assured, that the danger of short circuits and grounds is either cut in half or eliminated, and that there is no loss of current due to frame insulation. A double wire generator can be and is often used with one side grounded to the frame as a single wire system.

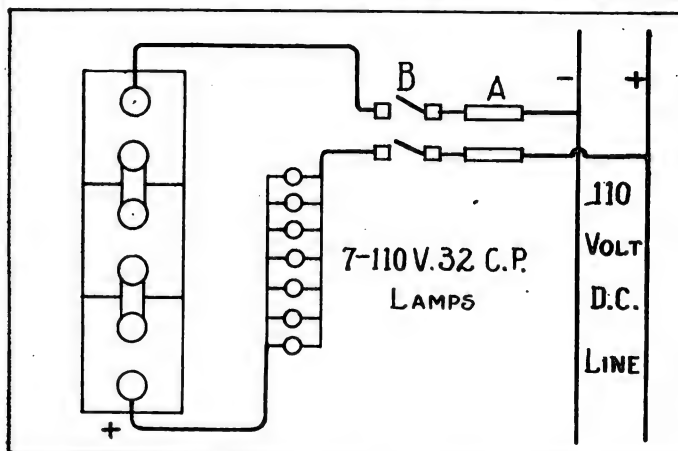
CHARGING STORAGE BATTERY.

(J. L., Louisville, Ky.)

Will you please give me directions for charging an Exide battery? This is a three-cell battery and was removed from a Buick car. I think that the type is 3-XC-15.2. I have access to either 110 or 250 volt circuits. (Both direct current.) I should like to know how to determine the polarity and also how many lights to use for resistance.

The following directions apply to the Exide, three-cell battery and are not applicable to any battery of a different voltage.

The charging rate for this type of battery should be about seven amperes and to allow this amount of current to pass from a 110-volt circuit the following number of lamps should be arranged as shown in the cut. Seven 110 volt, 32 candle-power (100 watt) carbon lamps, or 14 110 volt 16 candle-power (50 watt) carbon lamps, or 18 110 volt 40 watt tung-



Charging Storage Battery from D.C. Line. A, Fuses; B, Switch.

sten, or 28 110 volt 25 watt tungsten lamps may be used. The wire should be at least number 10 B. & S. gauge or larger and the fuses not less than 10 amperes.

Always connect the positive terminal of the battery to the positive wire of the charging circuit and the negative wire of the circuit with the negative battery terminal. To determine the polarity of the charging circuit, dip the ends of the two wires into a glass of water in which is dissolved a teaspoonful of salt. Fine bubbles of gas will be given off from the negative wire.

The charge should be continued until all of the cells have been gassing or bubbling freely for five hours, and there is no further rise in the voltage of the battery or specific gravity of the electrolyte over the same period. A battery in good condition in a discharged state will require about 10 hours of recharging.

Should the temperature of the electrolyte rise above 100 degrees it is an indication that the charging current is excessive and one or more of the lights should be removed from the sockets. Under no conditions must the temperature be allowed to rise above 110 degrees. Should this tendency develop, throw off the switch immediately.

KING LUBRICATING SYSTEM.

(A. E. H., Atlanta, Ga.)

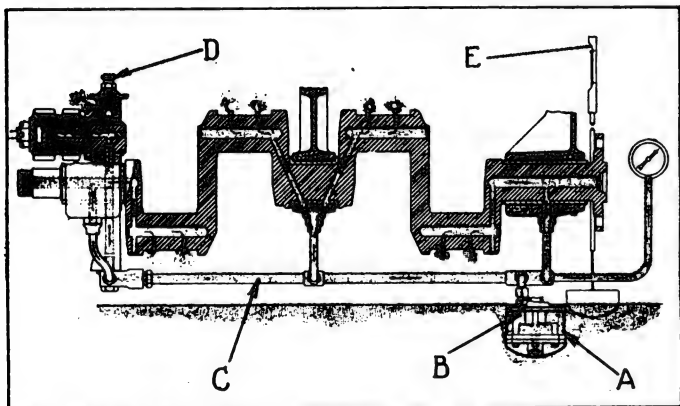
I have read in numerous papers and have been repeatedly warned against allowing the oil level in my King (model E) car to get too low. I have made a careful examination of the

engine when it was pulled down and I do not understand the system. Should the connecting rods dip into the oil, as I have been told by other car owners? This does not seem to be the case in my car and I don't see how they can unless I put in a great deal of oil. When I put in much more the engine begins to smoke.

The connecting rods of the King model E car do not dip into the oil, as the system used is what is termed the "full force feed." Reproduced herewith is a cross sectional cut of this oiling system and the action is as follows:

From the oil reservoir in the crank case the lubricant is drawn through the screen A, by the pump B, and forced into the main oil header C, which has five branches. The one on the extreme left leads to the front main bearing, the next, to the camshaft chain adjusting sprocket, the third and fourth to main bearings and the last to an oil pressure gage. The oil pressure may be regulated and is prevented from becoming excessive by the pressure regulating screw D. Through the outlet controlled by D oil passes in a fine spray to the chains, etc., in the front part of the engine, lubricates them and then the surplus flows back to the reservoir.

The crankshaft is bored with distributing holes; oil from the header branches passes through the bearings, thence through the shaft to each connecting rod bearing; due to the pressure, excess oil is thrown off from the connecting rods and serves to lubricate the camshaft, cylinder walls, pistons and such parts as are not fed directly by the system. The oil level should be kept within the limits as indicated upon the gage E, which registers both the maximum and minimum heights. If the engine base is filled with oil at the start when the ducts are drained, though the indicator registers "Full," it does not mean that oil is sufficient. The engine should be run for a few minutes, when it will be found that the oil



Diagrammatic Sketch of King Lubricating System.

level drops to a certain extent, then it is well to fill the base to make up for the difference.

The valve adjustment screw D should not be tampered with unless the pressure drops very low or raised above 20 pounds when the engine is speeding up. Turning the screw to the right will cause an increase in pressure, to the left a decrease.

The oiling system should be drained every 1000 miles by removing the plug beneath the oil pump, in the engine base, and the plug under the flywheel housing, draining out the oil, replacing the plugs and filling case with about one gallon of kerosene poured through the oil filler tube. Rock the car so as to agitate the kerosene in the case, then drain it off in the same manner as the oil was drained. The oil pan should then be filled with new lubricating oil, as directed above. About seven quarts is required.

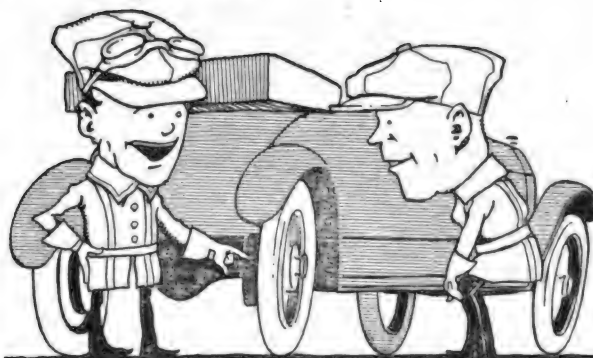
MITCHELL FIRING ORDER.

(E. N., Boston, Mass.)

Will you please give me, in your next issue, the correct firing order for a 1916 Mitchell car? How shall I set the breaker box points and how shall I wire up the distributor?

If the cam in the breaker box or the distributing gears have not been changed, turn the engine crankshaft over by hand until the piston in number one cylinder (the first from

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front end of car) comes to the top of the compression stroke. (The compression stroke is the up stroke of the piston after the down stroke in which the intake valve opens.) The spark lever should then be placed in such a position that the points in the breaker box are separated (maximum separation about 1/50 of an inch). It will now be found that the distributor brush is opposite a certain segment. The binding post of this segment should be connected with number one spark plug. Now connect the balance of the spark plugs in their firing order, 1, 5, 3, 6, 2, 4, with the remaining posts on the distributor, in the order around the distributor in which the distributor shaft revolves.

If the relationship between the timing gears has been changed by the disassembling of this part of the engine it will be necessary to reset the timer and distributor shaft to conform. Advance the spark lever about one-fourth way of the quadrant and turn engine piston number one to the top of the stroke. Remove the distributor cap and set the combination breaker and distributor on the shaft so that the breaker contacts are just opening and distributor segment is opposite distributor brush. Tighten set screws and proceed as directed above.

STROMBERG MODEL K CARBURETOR.

(J. T., Pawtucket, R. I.)

Will you please give me directions for adjusting a Stromberg model K carburetor? Is it true that atmospheric conditions make a difference to the adjustment?

The Stromberg model K carburetor is provided with two adjustments, a low speed and a high speed. The needle valve which controls the flow of gasoline through the high speed jet or nozzle is located at the bottom of the carburetor at right angles to the drain cock. Turn this valve to the right (clockwise) until it is seated, being careful not to twist it against the seat too hard, then turn back to the left 1¼ turns. Start the engine and after it is thoroughly warm, note whether the engine backfires or not. If it does, it is an indication that the mixture is too lean in gasoline, and the needle valve should be slowly turned to the left until the "popping" ceases. If, however, the engine runs sluggishly and misses fire when the throttle is suddenly opened, the mixture is too rich, and the needle should be turned to the right, until the sluggishness is eliminated. Another indication of richness is emission of smoke from the exhaust.

After the carburetor has been properly adjusted for high speed, close the throttle and make the following air adjustment for low speed. This adjustment screw is located on the top of the carburetor between the air intake and intake manifold. By turning the nut clockwise or down the spring tension is tightened on the air valve and less air is admitted, resulting in a richer mixture. Turning it in an opposite direction admits more air and produces a leaner mixture. Should the engine backfire into the carburetor or stop when the throttle is fully closed, the mixture is too lean and this adjustment should be turned two or three notches in a clockwise direction.

If the mixture at low speeds is too rich the engine will missfire and choke up when the throttle is opened suddenly. To remedy this trouble the air adjustment should be turned toward the left in order to admit more air and produce a leaner mixture.

CHEVROLET CAR VALVE CLEARANCE.

(A. E. S., Detroit, Mich.)

Will you please tell me how to adjust the valve push rods on the Chevrolet 4-90 car? I especially want to know the clearance between the push rod and rocker arm.

The space between the push rod and the rocker arm should be about .005 of an inch and if more than this can be lessened by loosening the lock nut, which is found on the lower end of the push rod and turning push rod until proper clearance is had. It is essential that the lock nut be tightened after adjustment is made.

Have you tried for the \$2.50 which is being paid for the best answer to the question at the head of QUERY column?

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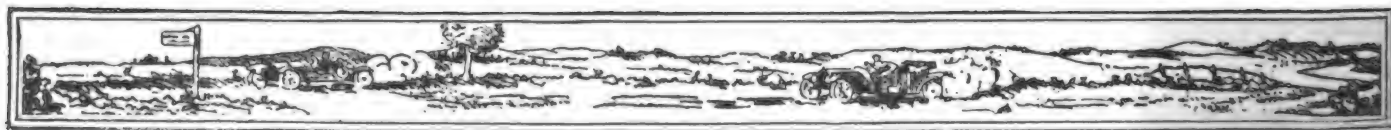
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Holyoke, Mass.	35				
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J					
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Jamaica, L. I.	26				
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K					
Kansas City, Mo.	6				
Kearney, Neb.	11				
Kearney's Ranch, Utah	11				
Kingman, Ariz.	6				
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L					
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Peerless

Purr and Punch

Two Power Ranges combine these opposite virtues in the Peerless Eight

A "Loafing" Range

For all ordinary driving one will use its "loafing" range. In this range it performs all of those feats of smoothness which distinguish the really fine from the ordinary car in the every day service. And in this range it is on half rations, consuming fuel so sparingly as to shame many a lesser powered six.

A "Sporting" Range

Among the finer cars of the day, there are a few which pretend no compromise with the demand for the gentler virtues of soft, smooth flexibility. Such cars are out and out exponents of the more rugged virtues of brute power and speed. In its "Sporting" range the Peerless Eight is ready to vie with such cars in their own special field.

The Peerless Dealer can easily demonstrate how much more a motor car means to you when you can run the whole gamut of motor car performance with one and the same car—the Peerless Eight.

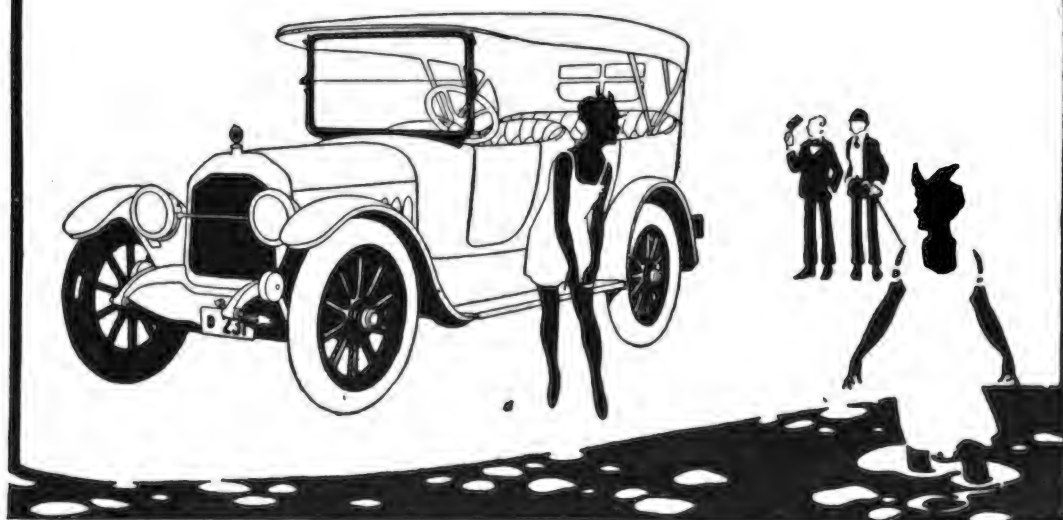
Touring, \$2090
Coupe, \$2750

Roadster, \$2090
Sedan, \$2890

Sporting Roadster, \$2250
Limousine \$3590

Prices f. o. b. Cleveland—Subject to change without notice.

The Peerless Motor Car Company
Cleveland, Ohio



(When Writing to Advertisers, Please Mention The Automobile Journal.)

Directory of Touring Information

KEY TO ROUTE INDEX.

The several routings presented below indicate the manner in which the itineraries in this number may be utilized in planning additional tours. Obviously, it would prove impracticable to list more than a very small proportion of the possible tours which might be arranged in this manner, and it is assumed that with this guide the tourist will have no difficulty in making his own plans as he desires.

BALTIMORE, MD.-BRETTON WOODS, N. H.

	Page	Miles
Baltimore to		
New York.....	6	199.6
Bretton Woods.....	34	392.6
Total Mileage.....		592.2

BOSTON, MASS.-PLATTSBURG, N. Y.

	Page	Miles
Boston to		
Williamstown.....	36	168.3
Burlington.....	30	148.9
Plattsburg.....	23	71.0
Total Mileage.....		388.2

BOSTON, MASS.-ATLANTIC CITY, N. J.

	Page	Miles
Boston to		
New York.....	34	245.7
Atlantic City.....	26	153.5
Total Mileage.....		399.2

BOSTON, MASS.-SAN FRANCISCO, CAL.

	Page	Miles
Boston to		
Chicago.....	52	1,199.2
San Francisco.....	10-11	2,497.6
Total Mileage.....		3,696.8

BOSTON, MASS.-ST. LOUIS, MO.

	Page	Miles
Boston to		
New York.....	34	245.7
St. Louis.....	5-6	1,053.6
Total Mileage.....		1,299.3

BOSTON, MASS.-DELAWARE WATER GAP, PA.

	Page	Miles
Boston to		
New York.....	34	245.7
Delaware Water Gap.....	24	80.9
Total Mileage.....		326.6

BOSTON, MASS.-PLYMOUTH, MASS.

	Page	Miles
Boston to		
Walpole.....	34	19.1
Plymouth, Reverse Route.....	30	42.0
Total Mileage.....		61.1

BUFFALO, N. Y.-ATLANTIC CITY, N. J.

	Page	Miles
Buffalo to		
Albany, Reverse Route.....	52	307.6
New York.....	23	152.7
Atlantic City.....	26	153.5
Total Mileage.....		613.8

BUTTE, MONT.-PORTLAND, ORE.

	Page	Miles
Butte to		
Spokane, Wash.....	46	354.1
Seattle.....	52	348.5
Portland, Ore.....	53	231.5
Total Mileage.....		934.1

CHICAGO, ILL.-PLATTSBURG, N. Y.

	Page	Miles
Chicago to		
Poughkeepsie.....	46	962.1
Plattsburg.....	23	293.4
Total Mileage.....		1,255.5

CHICAGO, ILL.-ATLANTIC CITY, N. J.

	Page	Miles
Chicago to		
Philadelphia, Reverse Route.....	10	780.5
Atlantic City, Reverse Route.....	26	133.6
Total Mileage.....		914.1

CLEVELAND, O.-CHEYENNE, WYO.

	Page	Miles
Cleveland to		
Chicago.....	52	390.7
Cheyenne.....	11	1,065.1
Total Mileage.....		1,455.8

CLEVELAND, O.-MONTREAL, QUE.

	Page	Miles
Cleveland to		
Buffalo, Reverse Route.....	52	191.9
Montreal, Reverse Route.....	53	538.6
Total Mileage.....		730.5

DAYTON, O.-BRETTON WOODS, N. H.

	Page	Miles
Dayton to		
New York, Reverse Route.....	15	669.3
Bretton Woods.....	34	392.6
Total Mileage.....		1,061.9

GETTYSBURG, PA.-PLATTSBURG, N. Y.

	Page	Miles
Gettysburg to		
New York, Reverse Route.....	10	220.2
Plattsburg.....	23	368.2
Total Mileage.....		463.8

GRAND RAPIDS, MICH.-CHICAGO, ILL.

	Page	Miles
Grand Rapids to		
South Bend, Ind.....	20	117.7
Chicago, Ill.....	52	104.9
Total Mileage.....		222.6

HARTFORD, CONN.-LAKE GEORGE, N. Y.

	Page	Miles
Hartford to		
Poughkeepsie.....	46	124.1
Lake George, Reverse Route.....	25	215.2
Total Mileage.....		339.3

HARTFORD, CONN.-ATLANTIC CITY, N. J.

	Page	Miles
Hartford to		
New York.....	30	124.3
Atlantic City.....	26	153.5
Total Mileage.....		277.8

HARTFORD, CONN.-NEWPORT, R. I.

	Page	Miles
Hartford to		
Providence.....	36	84.0
Fall River.....	30	19.5
Newport.....	30	18.5
Total Mileage.....		122.0

MINNEAPOLIS, MINN.-WASHINGTON, D. C.

	Page	Miles
Minneapolis to		
Chicago, Reverse Route.....	52	488.4
Indianapolis.....	19	224.7
Washington.....	5-6	576.2
Total Mileage.....		1,289.3

MINNEAPOLIS, MINN.-JACKSONVILLE, FLA.

	Page	Miles
Minneapolis to		
Chicago, Reverse Route.....	52	488.4
Jacksonville.....	19-20	1,250.0
Total Mileage.....		1,738.4

NEWPORT, R. I.-LAKE GEORGE, N. Y.

	Page	Miles
Newport to		
Fall River.....	30	18.5
Providence, Reverse Route.....	30	19.5
Pittsfield, Reverse Route.....	36	159.1
Albany.....	52	36.7
Lake George, Reverse Route.....	23	65.8
Total Mileage.....		299.6

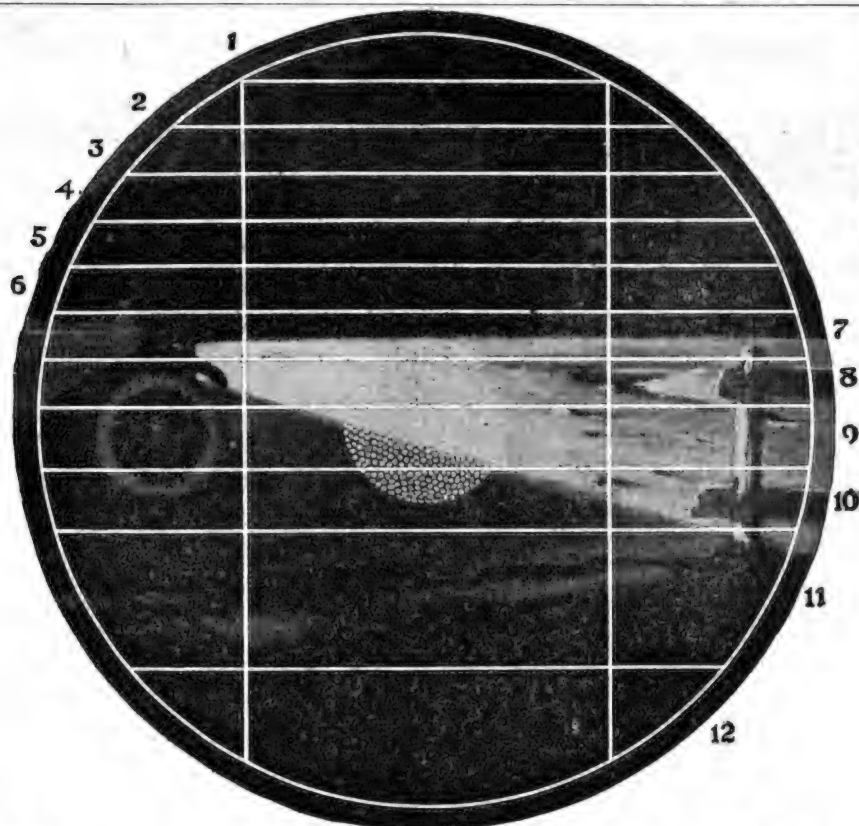
NEW YORK-SANTA BARBARA, CAL.

	Page	Miles
New York to		
Los Angeles.....	5-6	3,726.0
Santa Barbara.....	53	105.8
Total Mileage.....		4,826.8

NEW YORK, N. Y.-TALLAHASSEE, FLA.

	Page	Miles
New York to		
Washington, D. C.....	5	235.0
Atlanta, Ga.....	51	785.5
Tallahassee, Reverse Route.....	20	296.0
Total Mileage.....		1,316.5





Throws waist-high beam one-third mile. Write for interesting test data.

The New Osgood Lens is being officially sanctioned by the authorities of the most prominent cities.

74% More Light On the Road

Waist-High Beam Thrown One-Third Mile—No Glare

Light from the New Osgood Lens is not diffused—not scattered—not broken up at the expense of distance—not diminished in any way. The full power of the light is directed onto the road—all where you need it most—none above waist height.

The rut directly in front of your car; the ditch to the side; the incline a thousand feet ahead; the turn at one-third mile—

All these the searching ray from the New Osgood Lens shows you because of its twelve individual beams merged into one master shaft of light.

This long, low ray is always below waist height—never in the eyes of other motorists or pedestrians. Every exacting headlight ordinance complied with. No need of dimming. It is the light of new efficiency and courtesy.

As compared with a lens of plain glass, this twelve-prism, one-piece New Osgood Lens gives you 74% more light on the ground because it carpets the road with rays which formerly were thrown into the air.

Compared with a lens of ground glass, the equivalent of many diffusing and dimming devices, the New Osgood gives 910% greater road brightness. What other lens does this?

Sectional view of the New Osgood Lens, showing the smooth outer surface and the twelve inner prisms that operate as one.

The New Osgood Lens was specially designed for motorists by James R. Cravath, one of America's foremost authorities on illumination.

Its efficiency is emphasized in authoritative test-reports of the Armour Institute of Technology, Massachusetts Institute of Technology, and of the American Automobile Association. **Write for these conclusive tests.**

You need this lens. Go see it. You will want it once you do see it, regardless of what other lens you now are using.

Made in all sizes for all cars.

7 to 7½ inch, \$2.50 a pair 8¾ to 9½ inch, \$3.75 a pair
8 to 8½ inch, 3.00 a pair 9¾ to 11 inch, 4.50 a pair

Prices quoted on special sizes. 25c a pair higher West of Rockies. 20% higher in Canada.

If your dealer is not supplied, order direct giving his name, and we will deliver through him. In ordering, give diameter of old lens; diameter of opening in door frame; model and make of car.

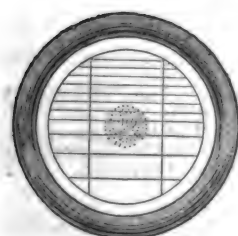
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This long, low, glare-free ray adds wonderfully to your night-driving comfort.



This is the ray of courtesy, efficiency and safety, 74% more light on the road.



**THE NEW
OSGOOD LENS**
CRAVATH LONG DISTANCE TYPE

Directory of Touring Information

PHILADELPHIA, PA.-PLATTSBURG, N. Y.

	Page	Miles
Philadelphia to		
New York, Reverse Route	5	95.6
Plattsburg	23	368.2
Total Mileage		463.8

PHILADELPHIA, PA.-BANGOR, ME.

	Page	Miles
Philadelphia to		
New York, Reverse Route	5	95.6
Burlington, Vt.	23	297.2
Bangor	30	547.3
Total Mileage		940.1

PHILADELPHIA, PA.-PLYMOUTH, MASS.

	Page	Miles
Philadelphia to		
New York, Reverse Route	5	95.6
Providence	34	201.0
Plymouth, Reverse Route	46	43.8
Total Mileage		340.4

PITTSBURG, PA.-PLATTSBURG, N. Y.

	Page	Miles
Pittsburg to		
New York, N. Y., Reverse Route	15	418.1
Plattsburg	23	368.2
Total Mileage		786.3

PITTSBURG, PA.-CHATTANOOGA, TENN.

	Page	Miles
Pittsburg to		
Dayton	15	251.2
Chattanooga, Reverse Route	20	439.2
Total Mileage		690.4

PORTLAND, ME.-ALBANY, N. Y.

	Page	Miles
Portland to		
Boston	34	146.2
Albany	52	281.4
Total Mileage		427.6

PROVIDENCE, R. I.-ST. LOUIS, MO.

	Page	Miles
Providence to		
New York	34	201.0
St. Louis	5-6	1,053.6
Total Mileage		1,254.6

PROVIDENCE, R. I.-GETTYSBURG, PA.

	Page	Miles
Providence to		
New York	34	201.0
Gettysburg	10	220.2
Total Mileage		421.2

PROVIDENCE, R. I.-ATLANTIC CITY, N. J.

	Page	Miles
Providence to		
New York	34	201.0
Atlantic City	26	153.5
Total Mileage		354.5

RICHMOND, VA.-WHEELING, W. VA.

	Page	Miles
Richmond to		
Washington, Reverse Route	51	121.6
Wheeling	6	271.7
Total Mileage		393.3

SAN FRANCISCO, CAL.-COLORADO SPRINGS, COL.

	Page	Miles
San Francisco to		
Salt Lake City, Reverse Route	10	1,055.3
Colorado Springs, Reverse Route	15	638.5
Total Mileage		1,693.8

SARATOGA SPRINGS, N. Y.-NARRAGANSETT PIER, R. I.

	Page	Miles
Saratoga Springs to		
Kingston	23	97.2
Providence, R. I.	46	263.9
Narragansett Pier	34	31.3
Total Mileage		392.4

SPRINGFIELD, MASS.-NARRAGANSETT PIER, R. I.

	Page	Miles
Springfield to		
Walpole, Reverse Route	30	89.9
Narragansett Pier	24	55.9
Total Mileage		145.8

SPRINGFIELD, MASS.-RICHMOND, VA.

	Page	Miles
Springfield to		
New York	30	149.9
Washington	5	235.0
Richmond	51	121.6
Total Mileage		506.5

ST. LOUIS, MO.-NIAGARA FALLS, N. Y.

	Page	Miles
St. Louis to		
Dayton, Reverse Route	6	353.3
Toledo	20	154.0
Buffalo, Reverse Route	52	311.3
Niagara Falls	43	26.4
Total Mileage		845.0

ST. LOUIS, MO.-DETROIT, MICH.

	Page	Miles
St. Louis to		
Indianapolis, Reverse Route	6	242.4
Dayton, Reverse Route	15	110.9
Detroit	20	212.3
Total Mileage		565.6

TOLEDO, O.-PITTSBURG, PA.

	Page	Miles
Toledo to		
Lima, Reverse Route	20	78.0
Pittsburg, Reverse Route	10	251.4
Total Mileage		329.4

WASHINGTON, D. C.-CHICAGO, ILL.

	Page	Miles
Washington to		
Indianapolis	6	576.2
Chicago, Reverse Route	19	224.7
Total Mileage		800.9

WASHINGTON, D. C.-BRETON WOODS, N. H.

	Page	Miles
Washington to		
New York, Reverse Route	5	235.0
Bretton Woods	34	392.6
Total Mileage		627.6

WASHINGTON, D. C.-GREENPORT, L. I.

	Page	Miles
Washington to		
New York, Reverse Route	5	235.0
Greenport	26	115.0
Total Mileage		350.0

WASHINGTON, D. C.-PORTSMOUTH, N. H.

	Page	Miles
Washington to		
New York, Reverse Route	5	235.0
Portsmouth, Reverse Route	34	336.8
Total Mileage		571.8

WATERBURY, CONN.-WASHINGTON, D. C.

	Page	Miles
Waterbury to		
New York, Reverse Route	33	89.0
Washington	5	225.0
Total Mileage		324.0

WHEELING, W. VA.-NASHVILLE, TENN.

	Page	Miles
Wheeling to		
Indianapolis	6	304.5
Nashville	19-20	396.9
Total Mileage		701.4

WORCESTER, MASS.-PHILADELPHIA, PA.

	Page	Miles
Worcester to		
New York, Reverse Route	30	200.9
Philadelphia	5	95.6
Total Mileage		296.5

WORCESTER, MASS.-KANSAS CITY, MO.

	Page	Miles
Worcester to		
New York, Reverse Route	30	200.9
Kansas City	5-6	1,354.5
Total Mileage		1,555.4

ZANESVILLE, O.-MINNEAPOLIS, MINN.

	Page	Miles
Zanesville to		
Indianapolis, Ind.	6	232.1
Chicago, Reverse Route	19	224.7
Minneapolis	52	488.4
Total Mileage		945.2





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CHEAP OIL
BUY GOOD OIL—
IT'S CHEAPER**

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THE basic strength of an automobile tire is in the fabric and plies. Hood fabric is a special weave of the longest staple cotton grown. Extra plies compressed and welded together form an inner wall of defense against the shocks and jolts of road wear.

And for outer defense—the side and top covers of pure gum rubber—the stout tread—all moulded into a solid unit and made with the utmost care. Here are strength and resiliency. Here are mileage and economy in a degree found only in Hood Tires.

HOOD TIRE COMPANY, Inc., Watertown, Mass.

Quality is Economy



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SURPLUS Service to the car owner can mean but one thing to the dealer—Surplus Profits on an increasing volume of sales.

The Hood policy of service to the car owner through quality embraces a protection to the dealer which insures the profit and satisfaction of a Hood agency.

We will be glad to explain our dealer service and agency plan to those who are interested.

For overnight service don't substitute. See Automobile Trade Directory and Chilton's Directory for list of Hood Tire Distributors.

HOOD TIRE COMPANY, Inc., Watertown, Mass.

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**A CAMP
HOME
ON
WHEELS**



**JUST THE
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WIFE AND
KIDDIES**

Perfect Comfort In Car-Camp Tours

All pleasures of life in the open, with none of the discomforts of tent camping, can be enjoyed week ends or for longer periods, as well as the delights of motor touring.

With a Cozy Camp-Mobile you are independent of hotels. The saving of hotel expenses for three or four weeks will buy an equipment good for years of service, that you can use daily in your business. It is a high class outfit, splendidly constructed and equipped, that is not a luxury, but an investment that means better health, substantial pleasure for yourself and family, and a practical utility for almost unlimited service.

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Weight, about 600 pounds; shipping weight, crated, knocked down, with wheels inside crate, about 875 pounds.



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Sarven patent wheels, 1 1/4 in. rubber tires, \$165.

Wood artillery wheels, 2 in. solid rubber tires, \$177.50.

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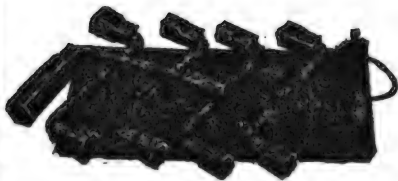
These include trailer and all equipment, f. o. b. Indianapolis, Indiana.

Nearly a Million FORDS on the Road

Help KEEP them on the Road by Using

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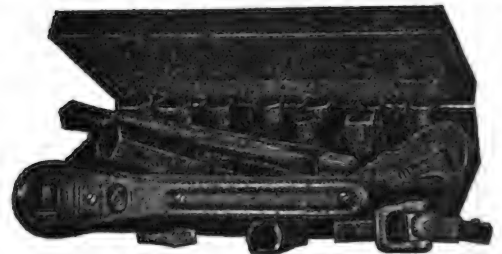
And Special Tools for FORDS



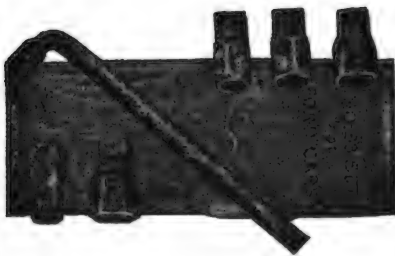
No. 17 Set—Heavy duty for Ford. 10 sockets, including those special sockets for spark plug, rear axle housing and cylinder head nuts. Price each, \$2.00.



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Means



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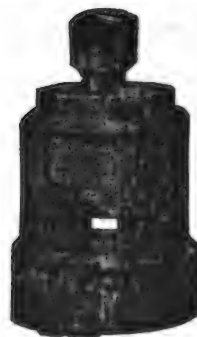


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Your copy of complete Mossberg Tool Book No. 191A if you will send address.



No. 645, Reverse and Brake Pedal Tension Spring Wrench. The only practical wrench for this work. Each, 50c.



660 Wheel Puller. Indestructible and efficient. Each, 80c.



Combining all the special wrenches that help the smooth running of your car. Price, \$1.00.

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"More Power" means more mileage—at a lesser cost—at a lesser strain upon your motor—and a consequent saving on the general upkeep of your machine.

Put that Good Gulf Gasoline in your tank and feel the exhilaration of "More Power" in your motor.



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AND SUPREME AUTO OIL

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REFINING
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leaves less carbon in the cylinders for the reason that it contains no gum or sticky substance, such as paraffine, to collect and hold the free carbon.

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1074% INCREASE IN SALES AND PRODUCTION IN ONE YEAR

Never before has any company made such rapid and substantial progress in the same length of time.

From 724 to 7,776 Cars in One Year

No other car has ever been accorded such widespread approval so as to cause increase in production and sales from 724 cars the first year to 7,776 cars the second year.

Think of what an extraordinary growth this really is. More than ten times as many cars the second year as the first. No other car builder has ever approached such a record.

From 8,064 sq. ft. to 108,800 sq. ft. Factory Space in One Year

The ever-increasing demand and popularity of the Elgin Six has required expansion in our factory space from 8,064 square feet to 108,800 square feet in one year. And even with this record-breaking increase, we have been compelled to supplement our regular factory space by two large circus tents.

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The Most Wonderful Car in the World

Such phenomenal success could have resulted only from some most unusual merit.

The great outstanding reason for this record-breaking success is:

The most wonderful car in the world—a car that in the essential points of automobile



5-Passenger Touring

\$985

Elgin

ELGIN MOTOR CAR

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Is Broken

value, viz.: Beauty and Style, Performance and Mechanical Excellence, Durability and Economy, has never been equaled at the price.

The Elgin Six has stood "The Acid Test" by winning perfect scores and highest economy honors in every contest it has ever entered, including the Master Drivers' Contest, the most gruelling run ever devised by automobile experts.

It proves that the Elgin Six is right from every standpoint, because it has made good in the hands of its owners.

2000% INCREASE IN ASSETS IN ONE YEAR

Greatest Value at the Price

Owners of high priced cars are fast coming to realize that it is impossible to buy, at any price, a car of greater style and beauty, or a car of better performance. And as to economy, the Elgin Six stands alone. Three Elgins in the Reliability Contest of the Chicago Motor Club averaged 25.6 miles per gallon for the entire two days' trip. Its low weight also minimizes tire wear.

Elgin is the watchword of automobile economy, combined with distinction, comfort and endurance, establishing the highest standard of value in the \$1,000 class.

DEALERS ATTENTION

The addition of another big factory building now in the course of construction, is preparing us to double our output.

This enables us to take on a few more desirable dealers providing your territory is not already closed. Wiring or writing us immediately will bring details of our liberal agency contract.

Six

4-Passenger Roadster

\$985

CORPORATION, CHICAGO
MICHIGAN AVENUE





Qualities Which Win Your Admiration!

THE qualities which win your admiration for the great ocean liner—its beauty of line, its speed and power, its comfort—are the qualities for which the LEXINGTON Minute Man Six has become conspicuous.

And just as you forget the purely commercial aspects of the ocean liner in your contemplation of its beauty, so you forget the purely mechanical and utilitarian purpose of the LEXINGTON in your admiration for its style.

Lexington
MINUTE MAN SIX
\$1285

Both the ocean greyhound and the LEXINGTON Minute Man Six are, after all, made possible by their engines. In one the ingenious turbine has increased power and efficiency without proportionate increase of boiler space and weight—in the other a similar result has been attained by the Moore Multiple Exhaust System, one of the most important advances in gasoline engine design.

Only LEXINGTON can give you the advantages of the Moore Multiple Exhaust System, 22.8% more usable power with less gasoline, increased power at relatively low engine speeds, which means lessened vibration and wear and tear on engine and car, reduced carbon and ignition troubles—and much greater flexibility with less gear changing.

LEXINGTON Minute Man Six style and efficiency mark both the five-passenger Touring Car and the four-passenger Clubster—and you may choose between these two beautiful cars at the same price—\$1285.

Send for literature explaining LEXINGTON superiority.

THE LEXINGTON-HOWARD CO.
CONNERSVILLE, IND., U. S. A.

Automobile Journal

VOL. LXIII

JUNE 10th

NO. 9

NATIONAL OLD TRAILS

Under the Victory Arch
to Everywhere

FROM all angles of interest the National Old Trails Road, an ocean to ocean highway, enjoys great popularity among tourists. The main route of this trans-continental highway has termini at Washington, Baltimore and Los Angeles. The section westward, as far as the Ohio river, is the oldest and most historic thoroughfare in the United States and should be of great delight to every American, as it passes through places identified by historic events in our country's history which should serve to stimulate a strong patriotic sentiment. A tour along this highway takes the motorist through the heart of the country, from ocean to ocean, if he makes the complete itinerary,



and leading by diversions, almost anywhere.

In the Revolutionary War and again during the Civil War the United States experienced the crises of their existence and the majority of the important events that characterized these two periods took place in the territory lying south of New York City, between the Atlantic seaboard and the Ohio river and north of Washington.

This section is the richest in historic interest of any in the country and is also beautiful in scenery, being drained by the Delaware, Susquehanna, Potomac and Ohio rivers, all of which were prominently identified with the military manoeuvres in both wars. The Alleghenies also run through the centre of the region and supply mountainous scenery of exceptional beauty.

Starting from New York.

From New York to Philadelphia the Lincoln Highway is followed. The route runs through New Brunswick, Princeton, Trenton and Camden, over excellent highways. At Philadelphia the route turns southward, running along the Delaware river to Wilmington, thence through Elkton across the Susquehanna river to Bel Air, which is about 25 miles out of Baltimore.

From Baltimore to Washington, a distance of about 39 miles, the route is over the road once known as the "Washington Road," which was traveled by the stage coaches in the colonial days. Beyond Beltsville the Maryland agricultural station and the government aviation grounds are passed and a number of excellent examples of colonial architecture in old residences are seen. Bladensburg, the oldest settlement in Maryland, was the scene of the battle of Bladensburg,



Panoramic View on a Sunny Slope of the Appalachian Mountains

in 1814, when General Ross, commanding the English troops, defeated the American forces and gained entrance to the national capital.

At the Nation's Capital.

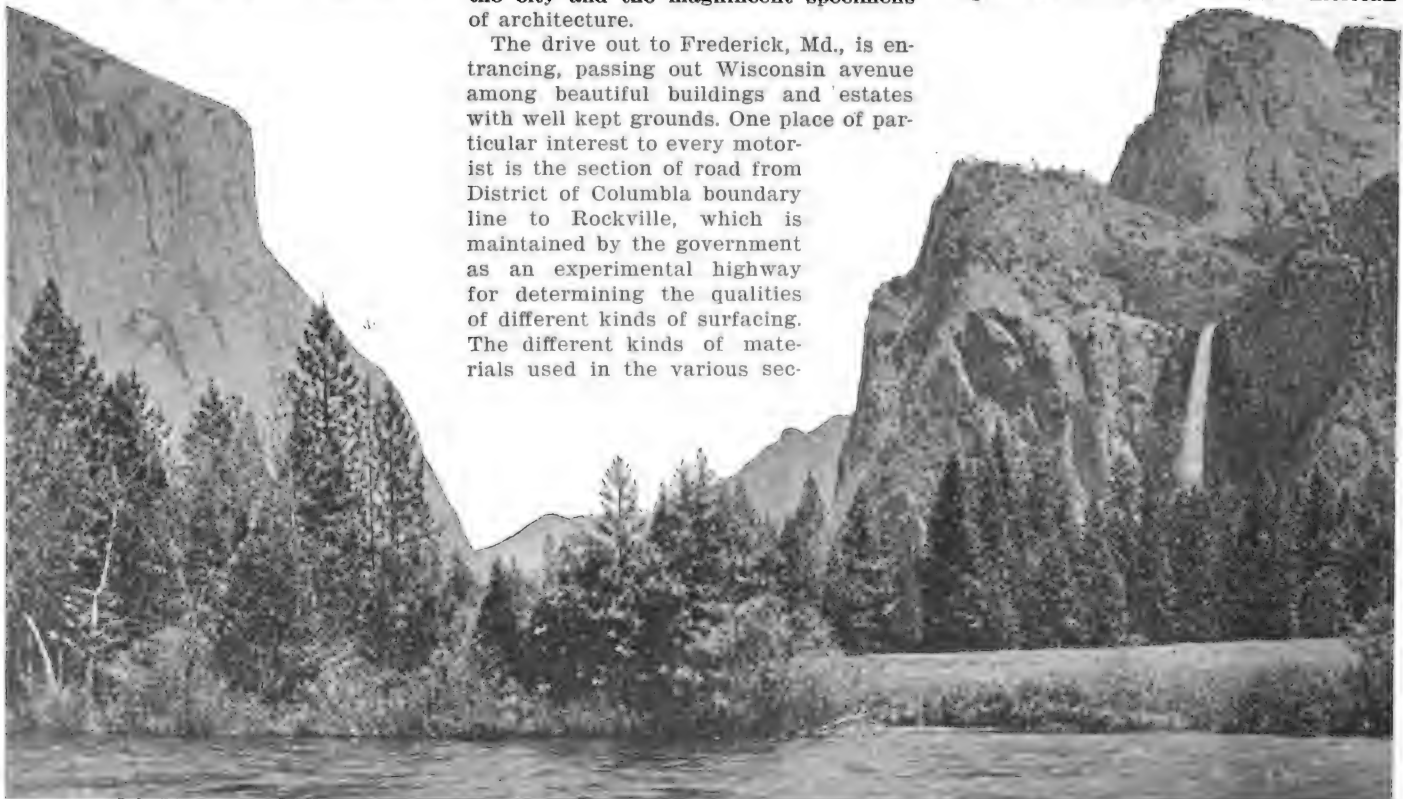
The tourist upon entering Washington will find so much of interest that he will be tempted to stay over the allotted time. A full week might be spent in inspecting the various government buildings and institutions. A ride around the principal avenues in the section of the Capitol and White House before leaving will suffice to give one a good idea of the layout of the city and the magnificent specimens of architecture.

The drive out to Frederick, Md., is entrancing, passing out Wisconsin avenue among beautiful buildings and estates with well kept grounds. One place of particular interest to every motorist is the section of road from District of Columbia boundary line to Rockville, which is maintained by the government as an experimental highway for determining the qualities of different kinds of surfacing. The different kinds of materials used in the various sec-

tions are designated by signs placed along the roadway.

Between Urbana and the Monocacy river is the battlefield of the Monocacy, where General Lee Wallace and his command were defeated by the Confederate soldiers under General Jubal Early in 1864.

Frederick, Md., was one of the main strategic points in the war for freedom, and during the Civil War was occupied by the Confederate soldiers. Thomas Johnson, the first state governor of Maryland, who nominated George Washington as commander of the American



Gateway to the Southwestern Mountains and Unnumbered Delights for the Touring Motorist.



In Maryland, Where the Typical Mountain Village of Eckhart Lies.

armies, had his summer home on Rose Hill, which lies on the outskirts of the city. A stone freight house of the Baltimore & Ohio railroad, said to be the oldest in the world, is also located in Frederick. In crossing over Carroll's creek an inscription will be noticed on the bridge marking the spot where, legend says, Barbara Fritchie lived, the character that Whittier made famous in his poem of that name.

On the road from Frederick to Braddock Heights the mountains come into view for the first time and very soon the ascent of Catoctin mountain begins. In less than two miles the road rises about 460 feet between Braddock Village and Braddock Heights. From the latter elevation a beautiful view of all the surrounding country may be obtained, particularly South Mountain battlefields and the War Correspondents memorial arch.

Through Historic Places.

In Middletown, the next closely built up place, is the old home of Commodore Gelsinger, who fought naval battles with the pirates at Tripoli and Algiers. Beyond this point the road rises precipitately again. Beyond the stone Catholic church on South Mountain, which is reached through Turner's Gap, there are a number of memorial tablets, on which a description is given of the movements of the opposing armies across the mountain. The largest and most important battles of the Civil War were fought almost within view of this mountain and it figured prominently in the military operations. It was here that Rutherford B. Hayes, who afterward became President of the United States, was wounded, and where William McKinley, who also became President, was first promoted.

Between South Mountain and Hagerstown, beyond Boonsboro, there is a short cut to Sharpsburg, from which place the Antietam battlefield may be reached. Hagerstown is the centre of a number of trunk highways extending North, South,

East and West. Antietam is 11 miles south of the city and Gettysburg, 35 miles northward. The road going out toward Cumberland ascends a grade coming in view of Conococheague creek, which winds around in the valley with short turns. A view may also be obtained from here of the mountains in the distance, which appear so formidable that the tourist doubts whether it is possible to ascend them.

In Wild Sections.

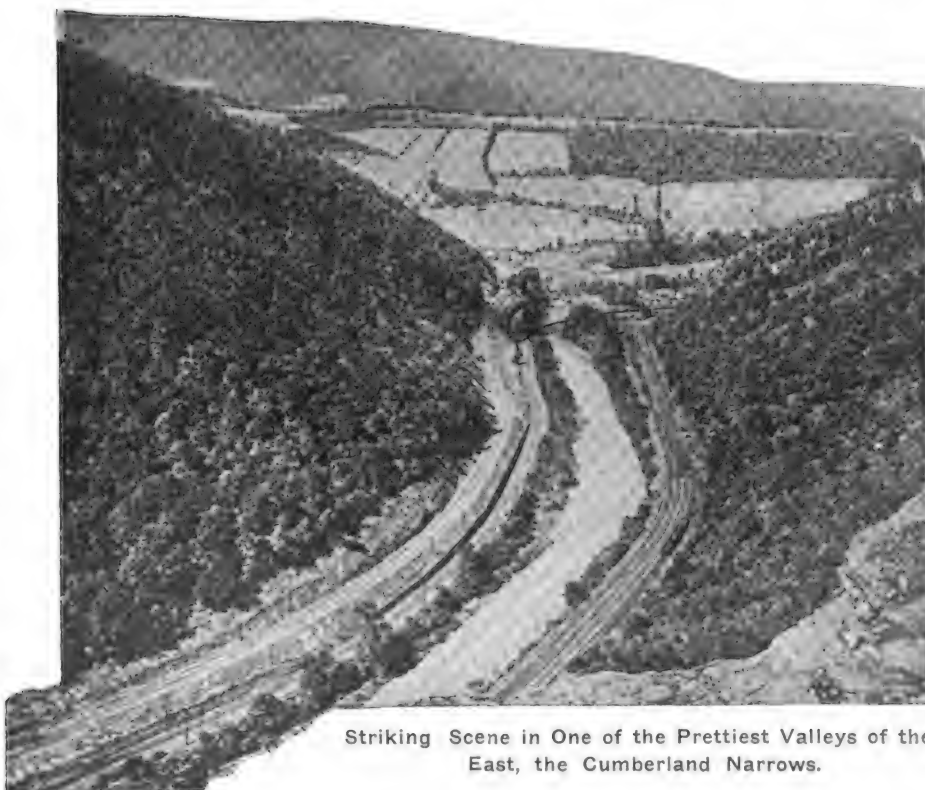
From the top of Fairview Mountain into Baltimore and Indian Springs the road lies through a comparatively wild section. Beyond the latter place it runs

along the Chesapeake & Ohio canal and Potomac river for a distance of 10 miles to Hancock, where it turns northward across the mountains. The country between these two points becomes a beautiful panorama of exquisite scenery to the rapidly moving tourists. Long and deep valleys stretch out to the horizon and mountain ridges and peaks close in the range of vision at times to an extent that one gains the impression of riding about in a huge pit.

The intervening distance, about 40 miles to Cumberland, is the most picturesque part of the entire trip. While the road winds around like a path in a maze and goes up and down the most precipitous grades of any well traveled thoroughfare in the country, it is easily followed. Out of Hancock the route leads up and over Tonoloway ridge, and further on over Sideling hill, where there is an ascent of 760 feet in a mile and a half. Down the other side of this range there is a descent of 495 feet in one mile.

Short Turns and Peaks.

The roads through this section are curved and contain many short turns, consequently, the motorist should drive very carefully, as while no danger exists to the machine that is under control, fast or reckless driving would be very foolish. Before the ascent of Town Hill, which is the next peak to be negotiated, some of the most beautiful scenic effects of the entire trip through the mountains become visible. The environment seems quiet and peaceful, as there is little evidence of habitation in view and one can see great distances into the mountains and across valleys and low plains. Coming down the west slope of Green Ridge, which is the next high elevation on the road, one of the largest cultivated apple orchards in the United States comes into view. There are nearly 50,000 trees in



Striking Scene in One of the Prettiest Valleys of the East, the Cumberland Narrows.

this orchard. Descending into the valley of Fifteen Mile creek, Polish mountain looms in the distance, across a great ravine, extending as far as the eye can see to the North and South.

Climbing Martin Mountain.

Passing on through Gilpin and into Flintstone, there is a hotel 108 years old, formerly known as the "Piper House," which looks little the worse for the wear of the elements. A few miles out of Flintstone the ascent of Martin mountain begins, during which a rise of 535 feet in a little over a mile is made to the summit, 1720 feet above sea level. Down the west slope the road leads through the valley into Cumberland on the Potomac river, the centre of transportation of that section. This city is about half way between Washington and Wheeling and is a convenient stopping place on the third night out, as it affords good hotel accommodations.

quaint town and it also contains many land marks nearly a century old. Twelve miles from Uniontown is Brownsville, on the Monongahela river, and 15 miles further on, Washington, which is the nearest point on the National road to Pittsburgh.

Now the Ohio Valley.

The route from Washington to Wheeling is mostly down hill and crosses the panhandle of West Virginia into the valley of the Ohio river. West of this point lays the great level farming lands and prairies that the pioneers of over 100 years ago sought after traveling over the National road to the Ohio river, and there is today an enormous amount of travel East and West through the city; more, probably, than through any other city of its size in the United States.

Here the Ohio river is crossed into Ohio. There is now an unbroken stretch of brick paving 16 feet wide through

The Marvelous Southwest.

The tourist first breaks into the real land of enchantment in leaving Raton, N. M., en route for Santa Fe. There is the wonderland of wonderlands with more marvelous scenic features than exist anywhere in the world. Even the atmosphere has its own peculiar charm, being rare and dry, although stimulating in its effect upon the senses. The horizon and zenith seem to be nearer the earth and objects take on a more definite outline and appear more vivid and fresh, while colors teem with the hues of the spectrum wherever the sun's rays strike.

It is a land of enchantment and the original inhabitants appear as weird to the newcomer in that territory as the animals in the zoo to a child upon its first visit. Here are also found ruins of habitations that were occupied by the oldest race of Americans of which there is any



In the Land of Montezuma May Yet Be Seen the Pueblo of Taos, Showing the Ancient Aztec Form of Community Dwelling Common Before the Conquest.

From Cumberland to Wheeling the distance is about the same as that traveled on the previous day and the route leads through the section which became prominent historically during the French and Indian war. This section was entirely constructed at the expense of the government. As far as Uniontown, which is half way to Wheeling, the road continues through the mountainous country, attaining much higher altitudes, however, the elevation at the summit of Big Savage mountain being 2880 feet and at Meadow mountain 2792 feet. A few miles out of Farmington, close by the road, is the site of "Fort Necessity," where during the French and Indian war George Washington was forced to surrender his command.

The remainder of the road into Uniontown is through a heavily wooded section. There are many old taverns in this

Zanesville to Columbus.

From Columbus to the Indiana state line, on the old National road, there is much brick paving, and from there on to St. Louis rough dirt roads, about the worst of the trip, are encountered.

At Booneville, Mo., the third of the old trails, the Santa Fe, begins and continues through Kansas City, across Kansas and a corner of Colorado, through New Mexico to Santa Fe.

Westward, Ever Westward.

Over excellent roads, through the wonderful Kansas wheat fields, the route goes west across the state. The Colorado line is crossed between Coolidge, Kan., and Holly, Col. The route crosses the Arkansas river at La Junta and shortly crosses the New Mexico line to Raton, to which it goes down through the Raton pass.

trace left. They lived in a period antedating most accounts in history and it was undoubtedly a prehistoric time.

As It Was Centuries Ago.

This is Pueblo country and the Pueblo Indians, unlike their brethren of the red skin, abjured all the advances of the white man to change their modes, dress, speech, customs and religions. They still adhere to the same type of abode and manner of eating and dressing as was handed down to them by their forefathers who met the Spanish and French explorers that came into their country over 300 years ago. The nondescript is present on every hand and the further into this maze of marvels the traveler goes the more the unexpected becomes the expected.

Santa Fe and the country immediately about the city, is worthy of a stopover



Awe Inspiring Grand Canyon of Arizona, One of the World's Greatest Natural Wonders—The Main Chasm Is 217 Miles Long and 9000 Feet Deep.

of several days and for an even longer period if one delights in delving into ancient lore. La Ciudad Real de la Santa Fe de San Francisco, as Santa Fe was called when it was founded by the Spaniards in 1605, 150 years before the United States became a nation, was a settlement, dating back into antiquity. For this reason it is now the leading centre of archaeological research in the United States and a school and museum of the American Institute is maintained there. It is in an old palace which has housed 76 rulers of Mexican and Spanish blood and 19 American territorial governors.

Grand Canyon of Arizona.

Passing into Arizona the first of the great sights of the Southwest that is encountered is a section of the Petrified Forest. This is looked upon as one of the chief marvels of the world. It is spread over several large tracts, the first of which is encountered six miles out of Adamana. Three miles further on is the second forest and the third and largest is 13 miles southwest of Adamana. There are two others, the Blue Forest and the North Sigillaria. The first named is seven miles southeast of Adamana and the latter nine miles north of that place.

Leaving Flagstaff the tourist takes the highway northward, a distance of 79 miles to Grand View Point, which is lo-

cated on the rim of the Canyon, where one of the most wonderful views of the region is to be had. From this point the highway runs through a winding course for 14 miles along the rim of the Canyon to Eltovar Hotel, where another wonderful view is visible. From the latter point the highway turns southward again and joins the main transcontinental highway at Williams.

The greatest minds of the world, upon first viewing this wonderful country, were at loss for words in which to describe their impressions. The mountains and huge embattlements, seem to speak from a long gone past.

Across the Mojave desert, once a great graveyard for travelers and their animals, a fine modern road, costing \$10,000 to \$15,000 a mile has been built. It is kept oiled most of the way and alkali dust is scarce on the run of 165 miles, which can be made at better than 20 miles an hour by almost any car. There are stations, too, where car supplies and food may be purchased. From Barstow, on the western side of the desert, it is a run of 78 miles to San Bernardino. El Camino Real, from San Diego to the north, connected the old Spanish missions, rare specimens of a distinctive architecture, with each other. Los Angeles is 68 miles from San Bernardino.

ITINERARY. NATIONAL OLD TRAILS ROAD.

Night Stops—New York City, Philadelphia, Washington, D. C.; Cumberland, Md.; Wheeling, W. Va.; Columbus, O.; Indianapolis, Terre Haute, Ind.; St. Louis, Columbus, Mo.; Kansas City, Emporia, Hutchinson, Dodge City, Syracuse, Kan.; La Junta, Trinidad, Col.; Las Vegas, Santa Fe, Albuquerque, McCarty's, Gallup, N. M.; Holbrook, Flagstaff, Kingman, Ariz.; Amboy, San Bernardino, Los Angeles, Santa Barbara, Pasa Robles, Santa Cruz, San Francisco, Cal. Thirty-one Days, 3726 Miles.

New York-Philadelphia.

	Miles		Miles
New York.....	0.0	Monmouth Jct.	46.8
Jersey City.....	6.3	Trenton	63.4
Newark	12.2	Oxford Valley.	70.0
Elizabeth	18.0	Hulmeville	73.6
Rahway	23.1	Andalusia	78.9
Iselin	27.4	Torresdale	81.1
Metuchen	31.4	Holmesburg	83.4
New Brunswick	36.0	Philadelphia ..	95.6

Philadelphia-Washington.

	Miles		Miles
Philadelphia ..	0.0	Perryville	60.9
Darby	6.3	Webster	64.0
Glendolen	8.2	Churchville	70.5
Norwood	9.3	Belair	76.3
Eddystone	12.5	Kingsville	83.5

Chester	13.6	Carney	89.7
Marcus Hook ..	18.5	Baltimore	100.4
Claymount	20.1	Elkridge	109.4
Holly Oak	21.2	Laurel	121.4
Wilmington	26.4	Contee	123.4
Elsemere Jet.	29.5	Beltville	126.9
Marshalltown ..	32.0	Hyattsville	133.4
Newark	40.0	Bladesburg	133.9
Elkton, Md.	46.6	Washington	139.4

Washington-Cumberland.

Washington	0.0	Benevola	62.7
Bethesda	7.4	Hagerstown	70.7
Rockville	15.3	Hancock	97.7
Galtherburg	20.5	Bellegrove	110.7
Clarksburg	28.5	Piney Grove	114.7
Hyattstown	32.4	Pratt	122.7
Frederick	43.7	Gilpen	125.7
Middletown	51.7	Flintstone	126.7
Boonsboro	59.7	Cumberland	139.7

Cumberland-Wheeling.

Cumberland	0.0	Summit	56.0
Frostburg	11.0	Uniontown	62.0
Grantville	25.0	Brownsville	74.0
Keyser Ridge	31.0	Scenery Hill	86.0
Addison	36.0	Washington	99.0
Somerfield	40.0	Claysville	109.0
Farmington	50.0	Wheeling	132.0

Wheeling-Columbus.

Wheeling	0.0	Norwich	60.5
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Terre Haute-St. Louis.

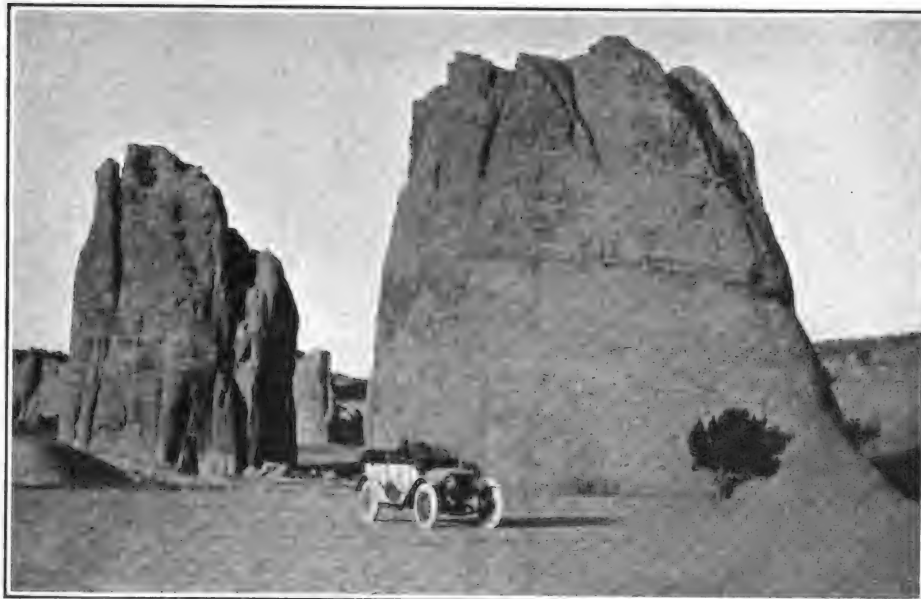
Terre Haute	0.0	Vandalia	100.2
Marshall, Ill.	16.8	Hagerstown	104.5
Martinsville	27.6	Mulberry	111.3
Casey	33.9	Greenville	120.0
Greenup	43.7	Pocahontas	139.0
Teutopolis	62.1	Highland	139.0
Effingham	66.0	Collinsville	160.0
Altamont	80.4	St. Louis, Mo.	172.0

St. Louis-Columbia.

St. Louis	0.0	Warrenton	65.9
Wellston	6.4	Jonesburg	75.7
Pattonville	14.4	Danville	88.7
St. Charles	19.8	Mincola	91.4
Colterville	30.8	Calwood	109.1
Wentzville	45.1	Fulton	117.0
Fortistell	52.1	Millersburg	128.1
Wright	56.6	Columbia	140.7

Columbia-Kansas City.

Columbia	0.0	Dover	103.5
Rocheport	14.4	Lexington	114.5
New Franklin	30.1	Wellington	121.8
Booneville	33.1	Levasy	132.3
Arrow Rock	53.6	Independence	150.2
Marshall	70.5	Centropolis	154.4
Waverly	92.3	Kansas City	159.2



The Haystacks, an Erosion Effect in the Great Natural Wastes on the Southwest-
ern End of the National Old Trails.

Bridgeport	1.2	Zanesville	72.4
St. Clairsville ..	10.9	Sterling	80.5
Lloydsville	16.1	Brownsville	86.3
Morristown	19.9	Linnville	91.0
Hendricksburg ..	25.6	Jacktown	95.0
Fairview	29.0	Hebron	99.0
Washington	40.6	Kirksville	105.0
Cambridge	49.0	Etna	111.6
New Concord	57.3	Columbus	128.1

Columbus-Indianapolis.

Columbus	0.0	Dayton	67.9
Alton	9.4	New Lebanon	78.3
W. Jefferson	14.4	Johnsville	80.2
Lafayette	21.8	W. Alexandria	86.2
Summerford	26.5	Eaton, O.	91.7
Brighton	30.3	Richmond, Ind.	107.6
Vienna	32.9	Centerville	113.7
Harmony	37.5	Cambridge City	123.0
Springfield	43.4	Lewisville	132.8
Enon	51.2	Knightstown	142.2
Fairfield	57.4	Greenfield	155.2
Harshman	63.7	Indianapolis	176.4

Indianapolis-Terre Haute.

Indianapolis	0.0	Coatsville	40.0
Bridgeport	9.0	Reelsville	45.9
Plainfield	13.8	Harmony	51.8
Belleville	18.7	Brassil	54.0
Stilesville	26.9	Seeleyville	62.5
Mt. Meridan	33.9	Terre Haute	70.4

Kansas City-Emporia.

Kansas City	0.0	Ottawa	71.2
Martin City	16.4	Williamsburg	88.4
Olathe	28.8	Waverly	101.5
Edgerton	46.7	Emporia	134.1

Emporia-Hutchinson.

Emporia	0.0	Florence	48.8
Cottonwood	21.8	Peabody	63.7
Elmdale	28.0	Halstead	95.2
Clements	35.7	Hutchinson	122.3

Hutchinson-Dodge City.

Hutchinson	0.0	Great Bend	68.0
Sterling	24.9	Kinsley	115.7
Lyons	34.4	Spearville	137.7
Chase	44.1	Dodge City	154.8
Ellinwood	57.6		

Dodge City-Syracuse.

Dodge City	0.0	Lakin	78.1
Colmarron	19.2	Kendall	95.0
Ingalls	26.2	Syracuse	107.4
Garden City	53.0		

Syracuse-La Junta.

Syracuse	0.0	Prowers	65.4
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Holly	22.0	Las Animas	93.7
Granada	39.7	La Junta	115.5
Lamar	57.3		

La Junta-Trinidad.

La Junta	0.0	Kadrew	76.3
Timpas	23.3	El Mora	87.6
Thatcher	54.8	Trinidad	91.3

Trinidad-Las Vegas.

Trinidad	0.0	Springer	69.7
Raton, N. M.	25.4	Wagon Mound	97.6
Maxwell	54.1	Watrous	120.5
French	58.9	Las Vegas	141.0

Las Vegas-Santa Fe.

Las Vegas	0.0	Pecos	49.5
Tecolote	12.0	Glorieta	55.6
Bernal	18.2	Canoncito	60.0
Pajarita	40.5	Santa Fe	75.2
Rowe	42.8		

Santa Fe-Albuquerque.

Santa Fe	0.0	Sandia	52.5
Domingo	26.9	Alameda	58.7
Algodones	41.2	Albuquerque	66.7

Albuquerque-McCarty's.

Albuquerque	0.0	Casa Blanca	55.1
Atrisco	3.3	McCarty's	82.2
Laguna	48.3		

McCarty's-Gallup.

McCarty's	0.0	Thoreau	43.0
Grant's	13.0	Gonzales	50.0
Toltec	17.0	Guam	54.0
Bluewater	25.0	Perea	58.0
Baca	33.0	Wingate	64.0
Chaves	40.0	Gallup	78.0

Gallup-Holbrook.

Gallup	0.0	Pinto	88.0
St. Michael's		Petrified For-	
Ariz.	26.0	est	102.0
Wide Ruins	56.0	Carrizo	111.0
Navajo	81.0	Holbrook	124.0

Holbrook-Flagstaff.

Holbrook	0.0	Tolchaco	75.4
Winslow	36.0	Flagstaff	117.0
Leupp	64.6		

Flagstaff-Kingman.

Flagstaff	0.0	Pica	101.0
Riorden	7.0	Yampai	106.0
Bellemont	12.0	Field's Station	108.0
Maine	20.0	Peach Springs	120.0
Chalender	24.0	Cherokee	126.0
Williams	36.0	Truxton	132.0
McClellan	44.0	Valentine	139.0
Ash Fork	56.0	Hackberry	144.0
Pineveta Station ..	64.0	Antares	151.0
Crookton	69.0	Hualpai	158.0
Seligman	81.0	Louise	172.0
Chino	85.0	Kingman	174.0

Kingman-Amboy.

Kingman	0.0	Homer	94.0
McConico	4.0	Goff's	102.0
Yuca	25.0	Fenner	111.0
Topcock	55.0	Danby	127.0
Needles	71.0	Cadiz	140.0
Klinefelter	83.0	Amboy	154.0

Amboy-San Bernadino.

Amboy	0.0	Todd	88.0
Barstad	7.0	Hicks	94.0
Ash Hill	21.0	Hellen	103.0
Ludlow	28.0	Oro Grade	113.0
Lavic	37.0	Victorville	119.0
Pisgah	42.0	Hesperia	127.0
Hector	47.0	Cajon	140.0
Newberry	61.0	Cory Dell Store	142.0
Mincola	67.0	Devore Store	149.0
Daggett	73.0	Vermont	151.0
Barstow	82.0	San Bernadino	160.0

San Bernadino-Los Angeles.

San Bernadino	0.0	Pomona	46.8
Riverside	10.9	Lemon	54.8
Bloomington	18.7	San Marino	72.7
Etiwanda	30.9	Le Senda	74.7
N. Cuckamonga	34.9	Pasadena	79.1
Upland	38.5	Los Angeles	89.9



Bending with the River.

Scene on This Route Near Glenbrook, Nev.

In El Dorado County, Cal.

GREAT TOUR FROM SEA TO SEA ACROSS AMERICA

TO ENTHUSIASTIC tourists thoughts of the Lincoln Highway bring to mind hopes for an early opportunity to take the "Great Tour," as a tour over this famous American road is already described by those fortunate motorists who have found time to drive over this well known ocean to ocean trail.

Passing over this route, guided by the Lincoln Highway markers and signs that have been placed at convenient points throughout its entire length, the tourist has revealed to him the panorama of American life and its wonderful scenic settings. From New York, where he finds all kinds of humanity, the melting pot of all races, successive stages of our country's development is suggested by the changing environment going westward. Going through New Jersey the great hives of industry are passed, and continuing for nearly a third of the distance, until the great steel centres are reached, this is the salient feature of the trip, combined with the numerous historical places of historical interest that are passed. The next stretch of a thousand miles lies through the great agricultural and cattle raising country and the last lap of the tour, through the mountainous country, along abysmal canyons, primeval forests, past towering mountains and precipitous water falls.

When the ideals of a certain set of men are attained—the same set that gave the world its luxurious touring car—motorists will also be able to enjoy the world's most luxurious and wonderful touring route. These men have distinguished themselves as captains of industry and men who stick to their tasks and apply every effort to see materialize the things that they had long pictured in their minds.

Stretching Across Eleven States.

When the Lincoln Highway was first visualized by these men, stretching

across 11 states from the greatest metropolis in the world, New York, to the Golden Gate at San Francisco, like a tremendous strip of velvet carpet, it seemed a fanciful dream and doubtful of successful execution owing to the vast stretches through sparsely inhabited sections, mountainous regions, deserts, forests and other apparent obstacles, seemingly insurmountable for highway extension. Today this highway stands as a monument to tireless effort, liberal contributions and perseverance, being one continuous route connected throughout its entire length of 3300 miles. Most of this distance is covered by improved modern roads of recent construction, while there are still some sections that are not negotiable in motor cars at certain seasons of the year. These short stretches, however, will be improved in the near future and the promoters will realize their dream of a continuous belt of surfaced highways stretching from the Jersey shore of the Hudson to the city of Oakland across the bay from San Francisco.

Automobiles have been driven over the Lincoln Highway from New York to San Francisco in slightly over five days, elapsed time, and the round trip has been

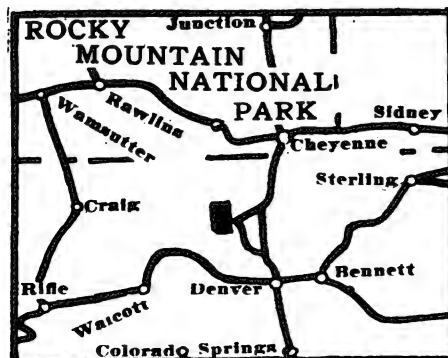
made in 10 days, 21 hours and three minutes, but these are records made by racing drivers specially prepared for the grilling ride which had to be made at utmost speed night and day. About a month is required to make the trip as a tour, an average of 18 miles and upward an hour being maintained during the driving time of about 10 hours daily. There are many stretches where the motorist can crowd on all the speed of which his car is capable, as the roads are good and traffic extremely light.

First Through New Jersey.

Starting at 42nd street and Broadway, in New York City, the world's greatest centre of traffic, the Lincoln Highway runs for a short distance, where the tourist drives aboard the ferry and takes a brief trip across the majestic Hudson to the Jersey shore. At Jersey City the route lies out over the Essex-Hudson plank road, which has been transformed into a beautiful boulevard. This road, which has been in use for over 100 years, runs out through Princeton, famous as the seat of the college of that name, formerly headed by President Wilson, on to Trenton, the Capital of the state.

In crossing the Delaware river the tourist is reminded of the famous exploit of the country's first President, who took his army in small boats and guided them to the other shores on a cold winter's night through ice packs and jams that for a time threatened the success of the enterprise. This famous manouever of Washington's during the Revolutionary War was enacted not far from the present site of the bridge that crosses the river at this point.

Other famous incidents of the war of freedom are brought to mind on the trip along side of the river toward Philadelphia, which is a route dotted with beautiful villages and roads lined by trees. At Valley Forge, where the famous commander and his men survived a winter of extreme hardships, is a chapel, erected



Roads Leading to Rocky Mountain National Park—For Connections See Master Map.

to the memory of the steadfastness of the men who faced starvation and death from freezing. Along the route through this section are found markers describing these events that stand out conspicuously in the history of America.

Through Scenic Pennsylvania.

Out over the Old Lancaster Pike, through the town of that name and on to Columbia, York, where the famous battle of Yorktown was fought, and to Gettysburg, where the most gigantic struggle between the forces of the North and South during the Civil War was waged, the highway is the most perfect of any in the country and lies through a section which holds the most historic lore of the United States, having been the battle ground of armies in conflicts that determined the perpetuation of the Union.

An arch at Chambersburg tells of the passage of Lee's army along the road on their trip through the city, which they reduced to ashes. Through Bedford and Ligonier to Pittsburg, the centre of the country's steel and iron industry, surrounding settlements indicate the comparative newness of the territory, although here and there one sees the remaining evidences of the white man's earliest attempts to establish communities, or monuments or memorials marking these historic spots.

Crossing Ohio the route lays through Canton, the home of the late martyred President, William McKinley; Mansfield and Lima, all thriving industrial centres. Throughout this part of the route and in Indiana, passing through Goshen, Ft. Wayne and Elkhart, one notices the many signs, markers and arches indicating the Lincoln Highway route.

At Valparaiso, just before crossing the line into Illinois, is Valparaiso University, which has more students than any other institution of learning in the United States. The highway passes 18 miles south of Chicago, through Chicago Heights into Joliet, thence to De Kalb and Dixon. In the latter place there is a marker showing where Lincoln delivered his speech in 1856 in one of the famous Lincoln-Douglas debates, when he was running for the presidency.

Through the World's Granary.

From the industrial communities the route now passes into Iowa, a farming state, but which has the record for per capita ownership of automobiles. In passing through Clinton, Cedar Rapids, Marshalltown and Jefferson to Council Bluffs the prosperity that the high prices of farm products has brought the residents is in evidence on many sides. After leaving Omaha the route continues

directly west through Nebraska over the famous dirt roads of that state, which are kept hard and in good condition by dragging and refilling.

Further westward the towns and cities are far apart and less densely populated, although the country is intensely interesting. In Wyoming, one of the great cattle states, which was once the centre of the "wild and woolly west," the cattle punchers no longer take pot shots at each other for luck or play a tattoo with their guns around a timid easterner's feet to see him perform terpschorean



Cathedral Spires—A Wonder Which Attracts Many Motorists to Yosemite.

antics.

These characters still live in the movies, but are no longer found in the cattle towns. Once a year, however, at Cheyenne, the old time arts of the westerners are demonstrated on what is known as Frontier Day, when cowboys and intrepid riders gather to show their mastery over bucking bronchos and throwing the lariat.

Division of the Route.

From Cheyenne there are two highways leading south from the Lincoln

Highway, one going through Greely and Brighton into Denver, and the other passing down to the Rocky Mountain National Park.

At the western end of the state a road branches north from Granger, passing through Jackson into the Yellowstone National Park. The Lincoln Highway leads from that point through Evanston into Ogden, Utah. Thirty-seven miles south of this flourishing little city is Salt Lake City, the capital of the state and centre of the Mormon religion. This city has the most romantic history possibly of any in the country, having been founded in 1847 by Brigham Young, who journeyed 1000 miles across the unexplored territory west of the Missouri river and settled in Salt Lake Valley with a party comprising 143 men, three women and three children. The city is about 12 miles east of Saltair, on Great Salt Lake, which is seven times larger than the Dead Sea of Palestine and carries the same percentage of salt, varying from 19 to 22 per cent., according to the season.

In San Juan county are some of the natural wonders of the world, including the great Augusta bridge, which has a span of 320 feet and a height of 265 feet from the bed beneath the arch. The roadway over the top is 32 feet wide. Organ Rock, a stone column, 400 feet in height, similar in appearance to a gigantic pipe organ, is also located in this county.

The Lincoln Highway leads out of Salt Lake City to the southwest, passing around the Great Salt Lake Desert and over natural roads for stretches of hard salt substances, which permits of driving at any rate of speed desired. Barren territory is also found throughout most of the trip across Nevada, although there are conveniently located stations and settlements where tourists may acquire necessary supplies.

Reno is reached at the end of about three days after entering Nevada. From this point there is the choice of two routes leading into Sacramento. The tourist may either go north around Lake Tahoe via Truckee or southward through Carson City along the shores of the wonderful lake. In passing over the Sierras the road at times reaches an altitude of 7000 feet.

California, Motorist's Paradise.

The last stretch of the Lincoln Highway lays between Sacramento and Oakland, where the tourist takes the ferry across the bay into San Francisco.

California has been described as the motorist's Paradise, and with its fertile

valleys, amid lofty mountain ranges and great scenic wonders, is certainly entitled to the appellation. Furthermore, the state's people are thoroughly alive to the fact that they reside in the world's wonderland and have spent over \$80,000,000 on beautiful highways in the last six years, that tourists and strangers in their state may conveniently reach all the scenic spots.

In this vast state there is one section which stands out prominently in the estimation of travelers and tourists. This is known as Central California, and embodies the central coast counties lying between the Pacific Ocean and the Sacramento and San Joaquin valleys, and including the latter. On the south the section is bounded by San Luis Obispo county and on the north by the counties of Mendocino, Lake, Colusa and Yolo. Concentrated in area section are found all the scenery, topographical conditions, fauna and vegetable life that make it a veritable wonderland.

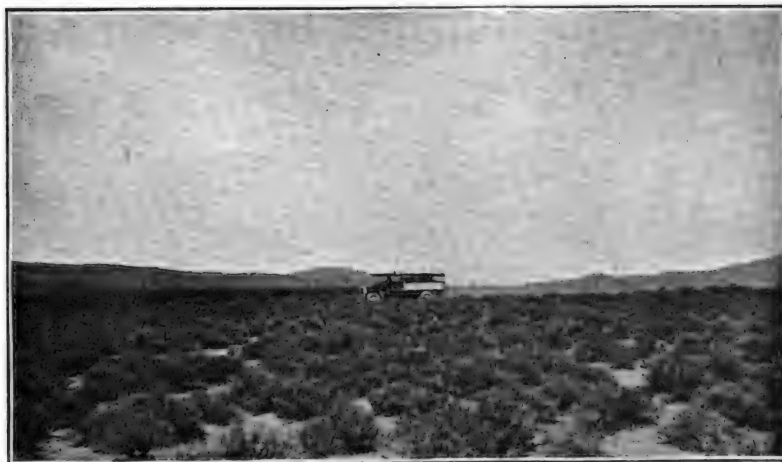
Hundreds of rivers rise in the mountain range to the east of the valleys and flow westward to join the big rivers that drain into Suisan Bay, which leads out to San Pablo and San Francisco Bays to the Golden Gate. This great natural irrigation system has made these valleys the richest and most productive agricultural and horticultural sections of our country and has made possible the creation of more wealth than all of California's great mineral resources.

Climatic Delights.

In most of this territory the climate is like that of a Mediterranean summer throughout the year and as a result it has become the mecca for tourists from all over the world. Thousands of other people have established their homes there, being attracted by ideal living conditions, beautiful scenery and foliage.

It is but natural that in such a glorious environment would be found a people who are alive and alert to their fortunes and surroundings. The residents are not only proud of but loyal to their bountiful habitations and have made improvements and established enterprises that are in keeping with the country and which have made accessible the many scenic spots and wonders that abound throughout the territory. A vast net work of wonderful roads has been built up in the state, which has earned it the title of "the motorists' paradise," a fact which is demonstrated in the registration of over a quarter of a million of automobiles in the state, which has a population of about two million and a half people.

Over 20 different tours have been mapped out through Central California, all of which crowd into a day's ride a multitude of interesting and beautiful sights. If San Francisco is to be made



Tracking the Sage Covered Desert on the Way Through Utah.

the starting point, the first glimpse into California's wonderland is gained on the "Half Moon Bay—La Honda Canyon Tour," which follows the shores of San Francisco Bay and the Pacific Ocean with cross country cuts through the La Honda valley.

Winding Along the Bay.

On the trip out through the Golden Gate Park the route passes along the shores of San Francisco Bay through Burlingame, a fashionable suburb, where the highway is lined on both sides with tall poplar and eucalyptus trees, into San Mateo. From the latter place a cut is made toward the ocean shores of the peninsula through the Causeway that separates the Crystal Springs Lakes and over the ridge of the Sierra Merena range of mountains, to Half Moon Bay.

Eighteen miles south of this town is Pescadero, where the route turns eastward again into the Pescadero and La Honda canyons. Through this stretch there are dense growths of ferns, brakes and berry bushes in the creek bottoms,



In Rocky Mountain Park.

while oaks, madronas, redwood, sycamores, laurel, eucalyptus and pine flourish on the hillsides. There is a nine-mile climb up the summit of the eastern slope of the Sierra Morena mountains and on the descent of the western slope into Portola Valley there are many beautiful vistas to the north and south.

The "Tomales-Inverness-Bolinas" tour is routed through a section known as the "Playground of Central California," lying on the peninsula to the north of San Francisco and bounded on the west by the Pacific Ocean

and on the east by San Francisco Bay. This route lies in the southwestern section of Marin county, which is renowned for its scenic drives, mountains and forests of redwood, pines, spruce and its level beaches and rugged coast line.

These tours form the net work of highways that lead from and along the shores of the ocean and bay to all sections of Central California. To the southward a beautiful highway runs along the foothills overlooking the ocean through San Mateo, Santa Cruz and Monterey counties. Much of the section is densely wooded and the coast line is wild and rugged.

Coast Line Drive.

At Monterey is the old custom house over which the American flag was first raised on the Pacific Coast. The Mission San Carlos and the Spanish quarter with many historic buildings also form interesting sights worthy of inspection. Two miles further along on the shores of Monterey Peninsula is the town of Pacific Grove, where the famous 40-mile drive starts. This drive is reputed to be one of the most perfect and beautiful in the world, skirting the rugged coast line within view of the Pacific Ocean for a distance of 40 miles to Carmel-by-the-Sea.

Turning to the northward again and crossing the Golden Gate to Sausalito, a beautiful highway leads to Santa Rosa, the home of Luther Burbank, the famous plant wizard, and the Petrified Forest, where the ground lies thickly strewn with trunks of trees turned to stone by the elements. Some of these are seven feet in thickness. Further on the road leads into Calistoga and southward through the famous Napa Valley, which is noted for its excellent highways, bridges, vineyards and scenery. It has also been called the "Valley of the Vine," because of the well kept vineyards and old stone wineries, and was at one time the home of Robert Louis Stephenson. Between these two routes is Sonoma Valley, given world wide publicity as the "Valley of the Moon," by the late Jack London, who maintained a beautiful ranch there.

California Redwood Park, in San Mateo county, amidst the Santa Cruz mountains, is one of the wonder spots of the state. It forms a gigantic bowl, the bottom covered with grass and wild flowers and the sides dotted with redwoods, many of which are from 350 feet in height and 50 to 60 feet in circumference. Its form has given it the name of "Big Basin." This preserve covers 3800 acres and belongs to the State of California. These are not the largest trees in California, those at General Grant National Park and the Giant Forest Groves containing the largest individual specimens. There is one in Mariposa Grove, Yosemite National Park, through which the highway passes and a motor car with its top up can pass through the great hole that has been cut in the butt to allow of passage.

Mt. Diablo Boulevard.

Mt. Diablo, 3849 feet above the sea level, is reached by good highways, which lead out of Berkeley by the tunnel road piercing the Berkeley Hills and emerging in Contra Costa county. The highway leads to the foot of the mountain and a fine new boulevard winds up its canyons to the summit, affording beautiful panoramas of the valleys and mountain peaks.

Another mountain peak, famous with tourists the world over, is Mount Hamilton, 4209 feet above sea level, where the Lick Observatory is located. This peak is in Santa Clara county and is reached by a perfect highway running from San Jose. The trip to the observatory if taken on a clear day is one of the most beautiful imaginable. In the last seven miles there are 62 curves. From the summit and on many stretches on the way up the valley is viewed for miles and one can look over San Francisco bay.

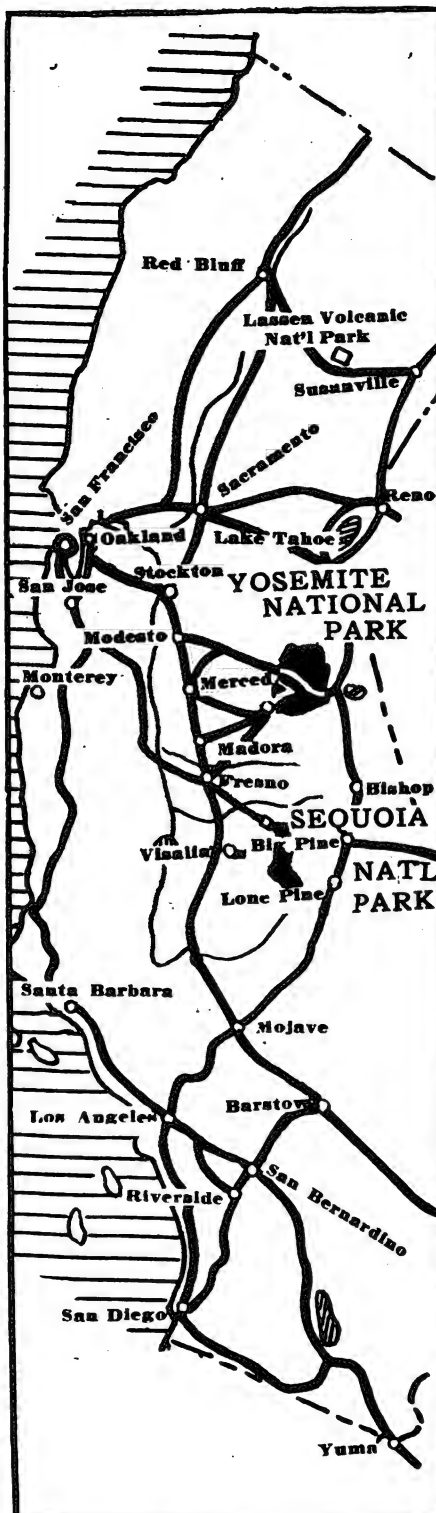
The Bohemian Club of San Francisco owns a grove of magnificent redwoods near Monte Rio, where dramas are enacted at different periods of the year. On the shoulder of Mt. Talmalpis, Marin county, is another natural theatre, where a mountain play is given annually before a great throng. At Santa Cruz a summer programme and pageant is given at River Theatre, beneath the beautiful trees, while on the grounds of Del Monte there are dramatic presentations in most picturesque of surroundings. The Forest Theatre at Carmel, Monterey county, where a large colony of artists and writers make their homes, is, next to the Greek Theatre, the scene of the greatest number of plays.

As for outdoor all-year sports California is supreme. Polo, golf, tennis, yachting, motoring, fishing, boating and bathing are indulged every month of the year. For winter sports the Yosemite Park and Huntington Lodge in the Sierras, in Fresno county, are widely known.

Tours into the Yosemite Valley and to many other points can be made over excellent highways, which will repay with entertainment and instruction any loss of time and money as the wonders unfolded are to be seen only in California and no where else in the world.

ITINERARY. LINCOLN HIGHWAY.

Night Stops—New York City, Philadelphia, Gettysburg, Bedford and Pittsburg, Penn.; Canton and Lima, O.; South Bend, Ind.; Chicago, Ill.; Clinton and Marshalltown, Ia.; Omaha and



California and Yosemite—See Road Connections on Master Map.

Kearney, Neb.; Julesburg and Denver, Col.; Cheyenne, Rawlins and Green River, Wyo.; Salt Lake City and Kearney's Ranch, Utah; Ely, Austin and Reno, Nev.; Sacramento and San Francisco, Cal. Twenty-Four Days, 3174.7 Miles.

New York-Philadelphia.

Ferry to Jersey City, N. J.	
Miles	Miles
Jersey City.....	0.0 Lawrenceville... 55.9
Newark.....	10.1 Trenton..... 61.8
W. Elizabeth.....	14.3 White Horse... 65.9
Elizabeth.....	16.3 Bordentown... 69.0
Iselin.....	27.2 Columbus..... 74.4
Metuchen.....	29.3 Burlington... 81.9
N. Brunswick.....	34.8 Bridgeboro... 87.1
Franklin Park.....	41.0 Cinnaminson... 91.0
Kingston.....	47.8 Camden..... 99.5
Princeton.....	50.8 Philadelphia... 101.5

Philadelphia-Gettysburg.

Miles	Miles
Philadelphia.....	0.0 Ladsburyville... 43.4
Ardmore.....	8.4 Strasburg..... 53.6
Bryn Mawr.....	11.5 Paradise..... 56.3
Wayne.....	15.4 Lancaster..... 65.9
Devon.....	16.9 Columbia..... 70.1
Berwyn.....	18.3 Wrightsville... 73.0
Dalesford.....	19.5 York..... 80.8
Paoli.....	20.7 Thomasville... 86.9
Malvern.....	22.2 Abbotstown... 104.6
Whitford.....	29.6 New Oxford... 108.8
Downington.....	32.9 Gettysburg... 118.7
Coatesville.....	39.5

Gettysburg-Bedford.

Miles	Miles
Gettysburg.....	0.0 Fort London... 34.0
Seven Stars.....	3.9 McConnellsburg. 44.1
McKnightstown.....	5.8 Harrisonville... 53.5
Cashtown.....	7.7 Breezewood..... 63.9
Fayetteville.....	19.1 Everett..... 73.3
Chambersburg.....	24.6 Mt. Dallas... 73.4
St. Thomas.....	32.0 Bedford..... 80.1

Bedford-Pittsburg.

Miles	Miles
Bedford.....	0.0 Greensburg... 67.5
Wolfburg.....	2.5 Grapeville... 71.6
Schellsburg.....	9.4 Adamsburg... 73.9
Buckstown.....	22.9 Irwin..... 76.9
Stoyestown.....	24.9 Jacksonvill... 78.1
Jenners.....	35.6 Circleville... 78.7
Jenners town.....	36.6 E. McKeesport. 84.5
Laughlins town.....	45.4 Wilmerding... 86.0
Ligonier.....	48.4 Wilkinsburg... 92.7
Youngstown.....	57.5 Pittsburg..... 100.0

Pittsburg-Canton.

Miles	Miles
Pittsburg.....	0.0 Unity, O..... 49.1
Sewickley.....	13.5 Columbiana... 54.7
Ambridge.....	17.7 Washingtonville. 60.9
Economy.....	18.7 Salem..... 66.0
Freedom.....	26.7 Damascus... 71.5
Rochester.....	27.7 Alliance... 73.6
New Brighton.....	30.7 Harrisburg... 86.4
Beaver Falls.....	32.2 Louisville... 90.9
Darlington.....	40.4 Canton..... 97.9

Canton-Lima.

Miles	Miles
Canton.....	0.0 Mansfield... 62.0
Massillon.....	8.0 Ontario..... 68.6
Brookfield.....	10.3 Gallon..... 77.0
Greenville.....	13.3 Bucyrus..... 88.0
Dalton.....	17.2 Osceola..... 94.5
East Union.....	23.5 Upper Sandusky 104.5
Woster.....	30.1 Forest..... 118.5
Jefferson.....	34.5 Patterson... 120.3
Reedsburg.....	39.0 Dunkirk..... 126.3
Jeromesville.....	43.7 Ada..... 136.6
Hayesville.....	48.2 Lima..... 153.5
Mifflin.....	53.7

Lima-South Bend.

Miles	Miles
Lima.....	0.0 Kimmell..... 94.7
Elida.....	6.5 Ligonier..... 100.2
Delphos.....	15.8 Millersburg... 109.4
Van Wert.....	20.1 Goshen..... 118.8
Convoy.....	35.8 Dunlap..... 123.5
New Haven, Ind.....	57.0 Elkhart..... 129.0
Fort Wayne.....	63.4 Osceola..... 135.0
Churubusco.....	77.9 Mishawaka... 140.3
Noblesville.....	85.2 South Bend... 144.3
Wolf Lake.....	89.7

South Bend-Chicago.

Miles	Miles
South Bend.....	0.0 Hessville..... 73.6
New Carlisle.....	13.6 Gibson..... 74.7
La Porte.....	25.9 Granselli... 75.7
Pinhook.....	34.3 Calumet..... 76.6
Westville.....	37.0 East Chicago... 77.7
Valparaiso.....	47.3 Whiting..... 80.7
Wheeler.....	54.8 South Chicago.. 86.0



Entrance to the Rocky Mountains from the East.

Hobart	60.0	Bryn Mawr.....	89.0
Gary	64.0	Chicago	101.1
Highlands	71.4		

Chicago-Clinton.

	Miles		Miles
Chicago	0.0	Rockelle	77.6
Austin	7.9	Ashton	89.6
Oak Park	11.3	Franklin Groves	94.2
Maywood	12.1	Dixon	103.9
Elmhurst	17.4	Sterling	118.3
Lombard	21.5	Emerson	121.9
West Chicago	30.6	Morrison	132.6
Geneva	36.1	Union Grove	136.3
Elburn	44.5	Fulton	143.9
De Kalb	60.3	Lyons, Ia.	145.2
Creston	71.5	Clinton	147.5

Clinton-Marshalltown.

	Miles		Miles
Clinton	0.0	Mt. Vernon	71.4
Elvira	9.5	Marion	84.6
De Witt	21.1	Cedar Rapids	90.4
Grand Mount	26.8	Belle Plains	126.9
Wheatland	37.1	Chelsea	133.4
Lowden	43.3	Tama	144.9
Clarence	51.8	Montour	158.4
Mechanicville	62.6	Marshalltown	167.4
Lisbon	69.6		

Marshalltown-Omaha.

	Miles		Miles
Marshalltown	0.0	Carroll	113.3
State Center	14.5	West Side	125.9
Colo	23.3	Vall	131.8
Nevada	30.6	Denison	140.9
Ames	38.7	Arion	149.4
Jordan	49.3	Dow City	151.9
Boone	54.9	Dunlap	160.5
Ogden	65.2	Woodbine	172.1
Beaver	71.6	Logan	182.2
Grand Junction	76.3	Missouri Valley	191.9
Jefferson	84.1	Loveland	196.6
Serranton	94.1	Crescent	207.0
Ralston	100.8	Council Bluffs	214.9
Glidden	105.8	Omaha, Neb.	219.3

Omaha-Kearney.

	Miles		Miles
Omaha	0.0	Ravens	108.6
Elkhorn	17.1	Clarks	114.1
Waterloo	20.3	Central City	127.0
Fremont	37.5	Chapman	132.8
Ames	45.8	Grand Island	150.1
North Bend	54.0	Alda	158.1
Rogers	61.2	Wood River	168.1
Schuyler	69.4	Shelton	176.6
Beaton	78.3	Gibbon	182.8
Columbus	85.9	Buda	191.3
Duncan	94.6	Kearney	196.5
Silver Creek	102.9		

Kearney-Big Spring.

	Miles		Miles
Kearney	0.0	North Platte	106.3
Odena	9.6	Hershy	119.9
Elm Creek	16.6	Sutherland	126.5
Overton	26.5	Paxton	138.7
Lexington	36.8	Korty	145.5
Cosad	55.1	Roscoe	151.6
Willow Island	60.2	Ogalalla	158.9

Fort Bridger	69.4	Wanship	158.6
Dog Springs	79.8	Gorgona	167.7
Spring Valley	86.9	Dale	178.0
Evanston	105.6	Salt Lake City	190.1

Salt Lake City-Kearney's Ranch.

	Miles		Miles
Salt Lake City	0.0	Palmer	54.0
Garfield	19.0	Pauls	60.0
Grantsville	28.0	Bullionville	105.0
Temple	35.0	Fish Spring	125.0
Josepa	45.0	Kearney's Ranch	145.0

Kearney's Ranch-Ely.

	Miles		Miles
Kearney's Ranch	0.0	Kent	100.0
Idapah	36.5	McGill	112.3
Tippett, Nev.	51.5	Ely	125.0
Shelbourne	70.0		

Ely-Austin.

	Miles		Miles
Ely	0.0	Rosevear's	35.0
Lane City	2.5	White Pine	41.0
Riepetown	10.5	Pancake	55.0
Kimberly	11.5	Eureka	77.0
Moorman's	32.5	Austin	147.0

Austin-Reno.

	Miles		Miles
Austin	0.0	Leetville	125.0
Alpine Ranch	47.5	Hansen	133.5
Eastgate	60.0	Fernley	146.0
Westgate	80.0	Wadsworth	149.5
Sand Springs	90.0	Sparks	179.5
Fallon	117.0	Reno	183.5

Reno-Sacramento.

	Miles		Miles
Reno	0.0	Magra	86.5
Lawton	6.5	Colfax	94.0
Verdi	12.0	Welman	99.2
Truckee, Cal.	35.0	Clipper Gap	105.9
Emigrant Gap	67.0	Auburn	111.9
Alta	79.0	Folsom	130.9
Gold Run	83.0	Sacramento	152.7

Reno-Sacramento.

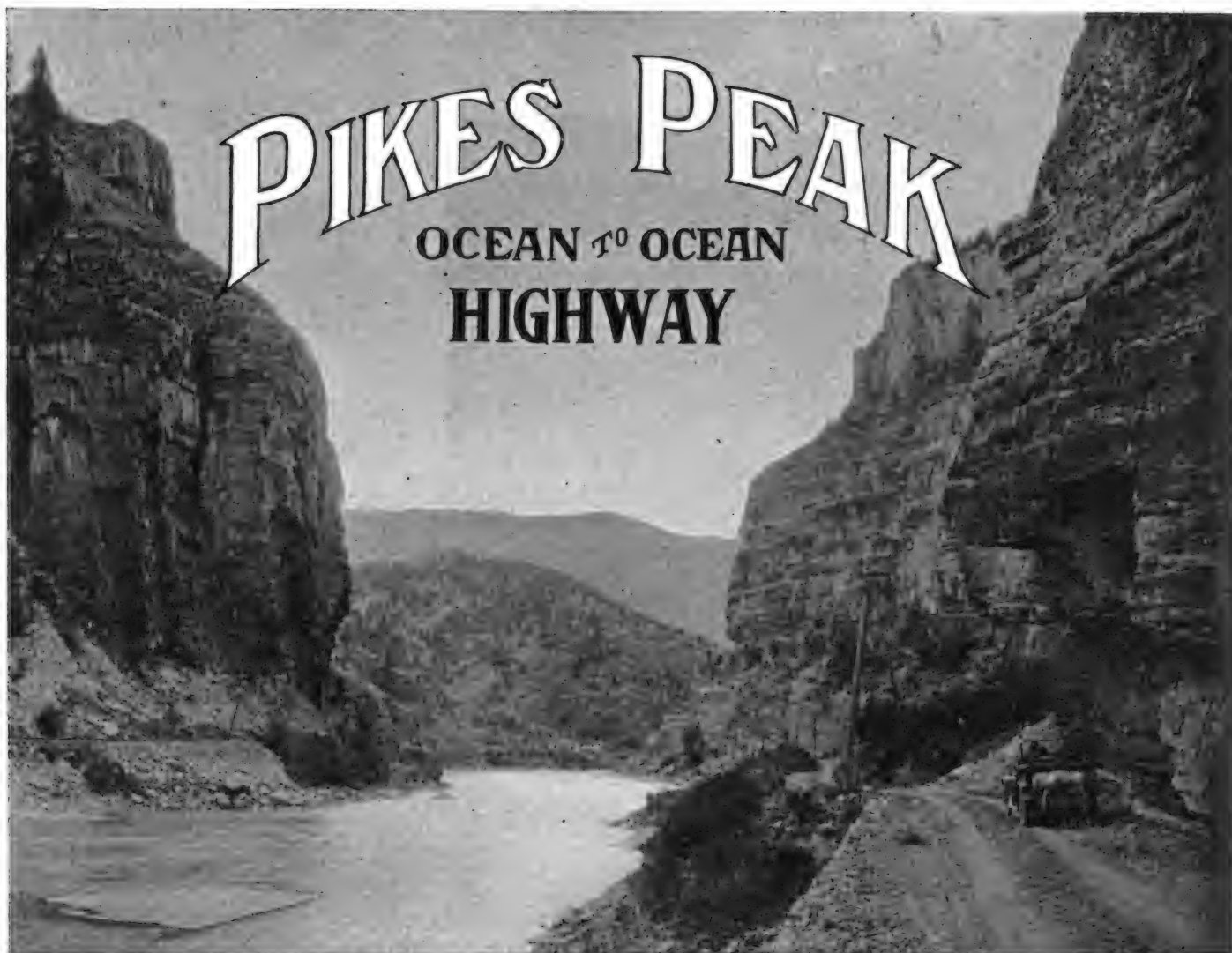
	Miles		Miles
Reno	0.0	Camino	110.9
Steamboat Springs	11.5	Placerville	117.9
Carson City	32.0	Eldora	125.4
Edgewood	58.0	Shingle Spring	130.4
Meyers, Cal.	67.7	Clarksville	138.4
Phillips	71.2	White Rock	140.4
Echo	78.4	Mills	153.9
Kyburn	88.4	Perkins	159.9
Riverton	98.4	Sacramento	165.9
Pacific	102.9		

Sacramento-San Francisco.

	Miles		Miles
Sacramento	0.0	Banta	69.3
Elk Grove	14.8	Janney	76.3
McConnell	17.9	Alta Mont.	87.9
Arno	20.1	Greenville	90.4
Galt	26.3	Livermore	95.2
Woodbridge	33.6	Dublin	105.5
Lodi	36.6	East Oakland	127.6
Stockton	52.4	Oakland	130.7
French Camp	57.4	San Francisco	136.2



Donner Lake, on Emigrant Gap Route, Lies in Ranges 7000 Feet Above the Sea.



ACROSS AMERICA THROUGH THE CENTRAL ROCKIES

By WALTER B. MONTGOMERY.

IN THE near future America will have a number of highways equal to those over which Joffre at the beginning of the German invasion of France in 1914 rushed his troops, and thus was able to stem the German tide and save France. This instance should demonstrate to patriotic Americans that good roads are a form of preparedness of immense military value in times of war and greatly conducive to the interests of commerce and pleasure in times of peace. The idea has been promoted by private individuals, small companies, and of late years by associations formed by the combination of interested groups all over the United States.

The Pike's Peak Ocean to Ocean Highway, which extends from New York to the Pacific coast via Colorado Springs, and from inquiries received by A. W. Henderson of Colorado Springs, National Highway Association secretary, it is believed that many thousands of tourists will pass over this route in autos.

For all tourists the Pike's Peak Highway offers numerous attractions. One advantage is that it is surfaced from New

York to Indianapolis, Ind., and will be surfaced through many other states. It is the most direct coast to coast route, being laid out on a straight line as near as the topography of the country will permit. It is also a fine scenic route, passing through the grand scenery of Colorado and other western states, including Utah and California.

While there are well beaten roads from Salt Lake on, either to San Francisco or Los Angeles, the actual Pacific coast terminus is not definitely decided upon; this, however, will be done shortly, and the official markers set out on whichever route is selected.

On leaving New York a few hours that seem like so many minutes, the tourist enters Trenton, N. J., where every healthy American will be interested in the executive mansion which housed Woodrow Wilson for four years while Governor of New Jersey. Thence proceeding southward the mountains of Pennsylvania become visible, and Philadelphia is entered. In Pennsylvania the route from Philadelphia to Pittsburg is called the "William Penn Division," in memory

of that grand old Quaker, whose bland face is so familiar to every school boy. The William Penn Division has great natural attractions. For 50 miles east and west of Huntingdon the trail winds over many hued mountains, through quiet, slumbering valleys and over streams of clear water, following the old stage coach and canal route of days gone by. Throughout its entire length the essences of romance, war and chivalry is felt. Following the William Penn road out of Philadelphia the tourist passes through Gettysburg, and one must needs stop and gaze upon the famous battle ground, now commemorated by a monument tabulating the names of those who perished for freedom's sake. Pittsburg, the city of smoke and millionaires, affords the last chance to sleep in a metropolitan bed before you get back on the Pike's Peak Highway again. The William Penn Division goes straight south from Pittsburg and merges with the Pike's Peak Trail at Washington, Penn.

At Philadelphia, should it be desired to remain on the original trail, then instead of going straight east from the City of

Brotherly Love, the trail skirts along the northern edge of Delaware and barely touches Maryland, making but one town, that being Baltimore. From Baltimore just a brief trip and behold the dome of the capital at Washington gleams a welcome.

On the way back to Pennsylvania the road touches at Frederick and Cumberland, from which place it follows the Old Cumberland Trail, built by the government in 1806 at a cost of over \$7,000,000. Uniontown and Washington are the last towns on the Pennsylvania division.

At Zanesville, O., the loop of this trail passes the biggest crockery and china plant in the United States. At Columbus it goes right past the state capital through the most beautiful part of the city. Here some of the flattest part of the trail is encountered, and the tourist can see for miles in any direction. Dayton, O., where the wonderful Wright brothers made their more wonderful aeroplanes, and where cash registers are made, is the last city stop in that state. By Pike's Peak Trail direct Dayton is 704 miles from New York City and 465 miles from Washington, D. C.

Proceeding on the Old Cumberland Trail the first Indiana town is Richmond, and at Indianapolis is the end of the old trail that has withstood more than 100 years of traffic and is still the best piece of highway in the United States. At Indianapolis there is a little jog southward that takes in Terre Haute and resumes the trail again at Chrisman; or if the Terre Haute trip is undesirable, the highway proper goes on from Indianapolis through Rockville, Danville and leaves the state at Chrisman.

Entering Illinois at Hume the trail con-

tinues on through some excellent farming country, the towns of Newman and Decatur are passed and at Springfield the trail passes the home of Abraham Lincoln and also the state capital, which is reputed to have the largest dome of any building of its size in the United States.

The highway enters Missouri at Hanni-



Gettysburg Battlefield—A State Monument.

bal, the birthplace of Mark Twain, paralleling the first railroad ever constructed across Missouri and following a historic trail. The next towns touched in their order are Monroe, Shelby, Macon, Brookfield, Chillicothe, Hamilton, Cameron, Stewartsville and St. Joseph. Here, where the pony express had its origin, a great copper monument has been recently erected in commemoration of the pony express riders, and Jesse James' house is one of the landmarks shown to visitors.

Kansas is entered via the historic town of Elwood, where on April 24, 1860,

the first railroad engine on Kansas soil was steamed. At this town the late martyred President, Abraham Lincoln, addressed an audience and on the very next day, Dec. 2, 1859, John Brown, the celebrated Kansan, who was regarded by some as the first emancipator of the slaves and by others as a religious fanatic, was hanged at Harpers Ferry, W. Va.

From Elwood the highway passes through Doniphan county, the apple and berry centre of the middle west, then Wathena, named for an old Indian chief, Wah-the-nah. The highway passes through Troy. Thence the highway skirts some of the most prosperous farming country in America. The tourist catches momentary views of big white farm houses and big roofed commodious barns; he notes stand pipes from which running water is supplied; at evening he spies windows made brilliant by incandescent lights supplied with current from the farmer's own plant. The old fashioned log house, now used possibly as a granary or summer kitchen, stands not far from the big,

almost palatial farm residence. Down the main streets of many thriving, prosperous Kansas towns the tourist will ride, streets lined with fine automobiles whose owners will no doubt before the season ends make a trip to one coast or the other. Passing through Hiawatha, Seneca, Marysville, Washington, the tourist arrives at Belleville, near which is the site of the peace conference held between Lieut. Zebulon M. Pike (in whose honor Pike's Peak was named) and the Pawnee Indians in 1806, when many red skins squatted on what is now valuable farm land and smoked



Lookout Mountain Loop, Familiarly Known as the Engineer's Lariat, a Highway Built by Prison Labor, Which Winds Its Way 1700 Feet Above the City of Golden, Col.

the pipe of peace with him and lied to him about the number of buffaloes they had killed and the number of enemies' scalps that adorned their teepees. All through this section the trail leads directly through America's great wheat, ranch and cattle country. Beyond Belleville the following towns are located on the right of way of the Pike's Peak Trail: Mankato, Smith Center, Phillipsburg, Norton, Colby and Goodland. It was in Kansas that Buffalo Bill (Wm. Cody) began his Wild West career by riding pony express out of Ft. Leavenworth.

When a little beyond the line into Colorado, the tourist will begin to notice bluish, cloud like shapes on the western horizon, and suddenly some one in the party will exclaim, "The Mountain." And there they are, distant, mysterious, with the fascination that since the cave days has always lured mankind westward to find out what is on the other side of those beckoning snow capped tops. Here the trail is almost the same as used by the Ute Indians long since. Now the tourist is beginning to get a taste of the real joy of camp life amid picturesque ravines, by the side of streams whose

the sea of restless clouds below him and turn them into a veritable kaleidoscope of color, he may be moved to murmur like the poet of Biblical days, "What hath God wrought."

Some tourists may wish to visit Denver. This may be done either by leaving the main trail at Limon and traveling northwest, or by going almost due north from Colorado Springs, passing through the famous Palmer Lake. If the tourist wishes he can go southwest to Buena Vista, or it can be reached by going almost due west from Colorado Springs. A zigzag course, taking in Leadville, Tennessee Pass and Wolcott, brings one to Glenwood Springs, another mecca for tourists.

Among the towns founded by pioneers is Salt Lake City, founded by the Mormons under Brigham Young. Here is the famous tabernacle, the roof of which is shaped like an inverted butter dish, and whose acoustic properties are the finest in the world. Following the custom of tourists one would want to enter and have some one drop a pin, just to ascertain if one can really hear the sound at the opposite end of the building. A short distance from the oval roofed

greater part of it.

From Salt Lake City one can take a run up to Ogden in an hour or so. Then if the choice is to go on to San Francisco, the last town in Utah will be Callao. After leaving Utah the way leads through the mining country of Nevada. Assuming that San Francisco is the goal the roads lead direct to Reno. From Reno, a loop leads to Carson, famous in days gone by as a mining town. Then comes a patchwork of irrigated section in California; then in startling contrast, 30 miles of desert. The tourist next finds himself in a veritable Garden of Eden as he approaches San Francisco. In this city, down along the wharves, there is a continuous bazar of nations. Sailors of every nationality swarm the docks; cargoes of every description are loaded and unloaded; vessels leave daily for the Hawaiian Islands and the mysterious Orient. Across the bay is Oakland, a suburb, which was the home of Jack London, tramp novelist, who wrote in an inimitable style of the North and the jungles.

The cosmopolitan atmosphere of San Francisco will not daunt the tourist, for in the ride from New York he has been continually in touch with all sorts and conditions of men and life. He has had a wonderful outing, some incomparable experiences and has seen America, the best part of it at close range, and has added much to his love for the land of such wonderful scenery, resources and people, whose enterprise makes the high-way possible.

Los Angeles, with its moving picture industries, is a treat for the tourist, and should it be designated by the association as a western terminus, the trip from Salt Lake City would proceed southwest, leaving Utah at the very southwest corner, following the Arrowhead Trail. This passes through Nevada at its narrowest part, thence through southern California, touching at Redland, and bringing up at Los Angeles. Hollywood, suburb of Los Angeles, and the home of more moving picture concerns than any other one place in the world, is worth an extensive visit.

As far as Salt Lake City the Pike's Peak Ocean to Ocean Highway is marked by poles painted with a red and white band, each 10 inches in width. Cross roads are plainly marked so as to leave no doubt which road is the right one. Between turns practically every telephone post along the trail is marked, and where there is an absence of poles the mark has been put on fence rails and rocks. In towns, at least two poles in every block are painted, making it easy to enter or leave a town without the usual difficulty of getting turned around once within the precincts of a city. The markings are distinctive and do not conflict with any other marking used by state divisions, so there is no need of getting lost if care is used. Sometimes a state road will merge with the ocean to ocean for a considerable ways, but in this case, both markings are used, but the tourist who is traveling on the Pike's Peak will watch the red and white posts.



On the Lower Plains of Colorado, with Pike's Peak Looming Majestic, Afar in the Background.

clear, cold contents emanate from the snows on the distant mountains. The latter stand like sentinels at night, and in the morning they seem to nod a radiant good morning. This feeling of safety that the mountains inspire in the average human may have descended from forefathers, who trusted the mountains as barricades against invasion. To nature loving minds the mountains are almost personified. Even the most practical minded cannot fail to enjoy the ever changing colors of the peaks as they loom plainer and larger as the auto approaches Colorado Springs. Pike's Peak finally rears its cloud wreathed head in magnificent grandeur and majesty as the tourist finds himself with scores of others rolling through the streets of Colorado Springs, one of the best known summer resorts of America. Near here is the famous Garden of the Gods, where nature in a playful mood molded huge rocks into fantastic resemblances to men and animals. If the tourist is of an energetic turn he will not miss seeing a sunrise from Pike's Peak. As he watches the first shafts of light strike

tabernacle is the new Mormon Temple, as beautiful and as well worth seeing as any ancient cathedral in Europe. The renowned tithing house, where every member of the Mormon church deposits to the church one-tenth of his income, is nearby.

The great Salt Lake, not far from the city, furnishes fine bathing, and in its waters the most awkward swimmer is safe, as the saline solution creates a buoyancy that defies the law of gravity. "Salt Air" is the name of this watering place.

This is as far as the Pike's Peak Trail proper is definitely organized, although the tourist has his choice of several good roads on to the Pacific coast, and usually follows the one to San Francisco. The popularity of the two rival towns of San Francisco and Los Angeles, each with their distinctive attractions, have made it a difficult matter to decide which should be the western terminus. Last year the touring was about equally divided on account of the two fairs running at San Francisco and at San Diego, with probably San Francisco getting the

The Pike's Peak Ocean to Ocean Highway Association is formed of a national board of officers and eight state divisions, each with a separate board of officers and directors; all of which comprise the directorate of the national association. The national officers are: President, C. F. Adams, Chillicothe, Mo.; vice president, Wm. Jennings, Harrisburg, Penn.; vice president, George W. Hughes, Hume, Ill.; secretary-treasurer, A. W. Henderson, Colorado Springs, Col.

Directors — Pennsylvania division: President, Wm. Jennings, Harrisburg; secretary, M. H. James, Harrisburg; Ohio division: President, John W. Aull, Dayton; secretary, E. W. Mentel, Dayton; Indiana division: President, F. R. Calvert, Rockville; secretary, C. M. Moffett, Bainbridge; Dr. I. S. Harold, Richmond; Arthur Rohm, Rockville; Illinois division: President, Geo. W. Hughes, Hume; secretary, H. A. Scheidker, Hannibal, Mo.; A. W. Kinney, Decatur, Ill.; R. H. McNulty, Springfield, Ill.; Missouri division: President, C. F. Adams, Chillicothe; secretary, H. A. Scheidker, Hannibal; R. S. Brownlee, Brookfield; W. L. Connett, St. Joseph; Kansas division: President, Dr. C. W. Cole, Norton; vice president, Lambert A. Libel, Wathena; secretary, A. Q. Miller, Belleville; W. R. Guild, Hiawatha; F. E. Lyle, Mankato; C. C. Webb, Highland; F. J. Hermann, Sabetha; C. J. D. Koester, Marysville; M. L. Hill, Belleville; A. B. Person, Seldon; F. A. Louis, Colby; Gilbert N. Kysar, Goodland; R. Frank Stinson, Phillipsburg; E. W. McNeilly, Norton; W. P. Noone, Jennings.

Walter B. Montgomery of Troy is publicity director. Colorado division: President, J. K. Rouze; secretary, A. W. Henderson, Colorado Springs.

ITINERARY. PIKE'S PEAK HIGHWAY.

Night Stops—New York, Reading, Penn.; Altoona, Pittsburg, Columbus, O.; Indianapolis, Ind.; Decatur, Ill.; Quincy, Brookfield, Mo.; Belleville, Kan.; Norton, Burlington, Col.; Colorado Springs, Leadville, Glenwood Springs, Rangely, Colton, Utah; Salt Lake City, Snowville, Wells, Nev.; Battle Mountain, Lovelock, Truckee, Cal.; Sacramento, San Francisco. Twenty-five Days, 3594.2 Miles.

New York-Reading.

Miles	Miles
New York . . . 0.0	Easton . . . 75.9
Newark . . . 10.6	Bethlehem . . . 87.4
Morristown . . . 30.2	Allentown . . . 93.1
German Valley . . . 47.4	Kutztown . . . 111.0
Washington . . . 62.9	Reading . . . 128.3

Reading-Altoona.

Miles	Miles
Reading . . . 0.0	Newport . . . 79.9
Stouchsburg . . . 17.0	Mexico . . . 97.4
Lebanon . . . 27.8	Lewistown . . . 112.9
Hummelstown . . . 43.9	Belleville . . . 127.6
Harrisburg . . . 53.4	Alexandria . . . 158.1
Clark's Ferry . . . 67.9	Altoona . . . 190.1

Altoona-Pittsburg.

Miles	Miles
Altoona . . . 0.0	N. Alexandria . . . 66.6
Hollidaysburg . . . 7.6	Delmont . . . 74.5
Summit . . . 17.4	Wilkesburg . . . 92.7

Clyde 47.5 Pittsburg 99.7 Pittsburg-Columbus.

Miles	Miles
Pittsburg . . . 0.0	N. Comerstown . . . 112.1
Florence . . . 24.4	Franklin . . . 130.6
Holiday Cove . . . 36.7	Dresden . . . 141.7
Steubenville . . . 44.7	Newark . . . 165.1
Cadiz . . . 65.8	Columbus . . . 179.1
Uhrichville . . . 87.0	Columbia C. . . 183.1

Columbus-Indianapolis.

Miles	Miles
Columbus . . . 0.0	Richmond . . . 110.1
Brighton . . . 30.2	Germantown . . . 124.3
Springfield . . . 44.1	Ogden . . . 142.0
Fairfield . . . 57.0	Greenfield . . . 158.2
Dayton . . . 68.1	Cumbarland . . . 168.6
Eaton . . . 93.1	Indianapolis . . . 179.0

Indianapolis-Decatur.

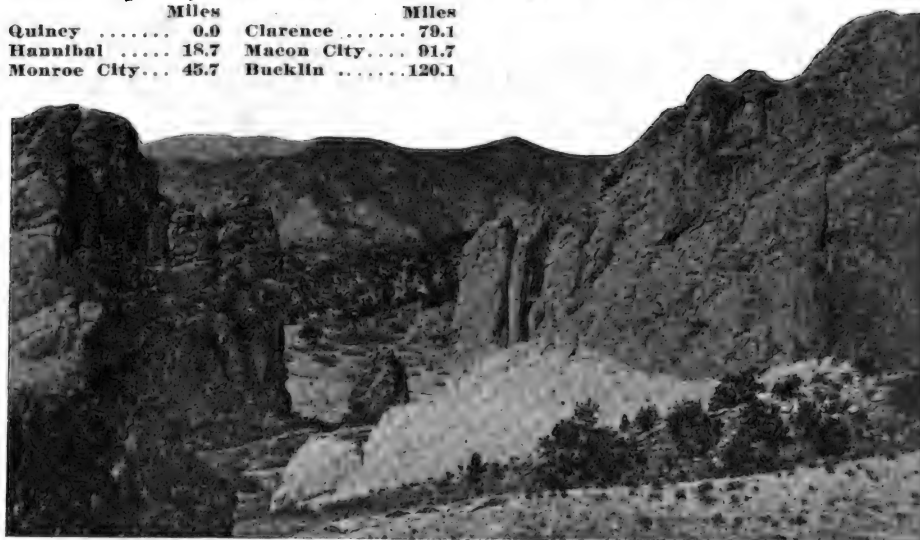
Miles	Miles
Indianapolis . . . 0.0	Chrisman . . . 85.3
Danville . . . 19.7	Newman . . . 103.5
Bainbridge . . . 35.9	Tuscola . . . 122.4
Rockville . . . 59.1	Hammond . . . 141.2
Montezuma . . . 67.7	Decatur . . . 164.8

Decatur-Quincy.

Miles	Miles
Decatur . . . 0.0	Beardstown . . . 100.9
Buffalo . . . 25.2	Rushville . . . 114.0
Springfield . . . 40.8	Mt. Sterling . . . 131.7
Berlin . . . 55.9	Clayton . . . 144.5
Jacksonville . . . 73.4	Camp Point . . . 150.6
Concord . . . 84.6	Quincy . . . 174.7

Quincy-Brookfield.

Miles	Miles
Quincy . . . 0.0	Clarence . . . 79.1
Hannibal . . . 18.7	Macon City . . . 91.7
Monroe City . . . 45.7	Bucklin . . . 120.1



Entrance to the Garden of the Gods, Colorado Springs.

Shelbina 66.0 Brookfield 131.3

Brookfield-St. Joseph.

Miles	Miles
Brookfield . . . 0.0	Hamilton . . . 57.3
Wheeling . . . 18.4	Cameron . . . 72.4
Chillicothe . . . 29.0	St. Joseph . . . 107.3

St. Joseph-Belleville.

Miles	Miles
St. Joseph . . . 0.0	Seneca . . . 85.8
Troy . . . 14.8	Beattie . . . 113.0
Highland . . . 35.2	Marysville . . . 121.1
Hiawatha . . . 49.5	Washington . . . 148.0
Sabetha . . . 68.0	Belleville . . . 185.5

Belleville-Norton.

Miles	Miles
Belleville . . . 0.0	Kensington . . . 79.3
Courtland . . . 16.7	Phillipsburg . . . 95.5
Mankato . . . 34.0	Prairie View . . . 113.5
Smith Center . . . 65.2	Norton . . . 138.0

Norton-Burlington.

Miles	Miles
Norton . . . 0.0	Colby . . . 96.3
Dellvale . . . 21.5	Brewster . . . 115.0
Jennings . . . 40.2	Goodland . . . 133.3
Selden . . . 63.3	Burlington . . . 163.7

Burlington-Colorado Springs.

Miles	Miles
Burlington . . . 0.0	Limon . . . 82.9
Stratton . . . 18.4	Mattison . . . 106.5
Seibert . . . 34.7	Calhan . . . 127.8

Arriba 58.7 Falcon 149.1

Gemsa 70.6 Colorado Spr'gs 168.6

Colorado Springs-Leadville.

Miles	Miles
Colorado Spr'gs . . . 0.0	Bath . . . 75.3
Edlowe . . . 20.6	Buena Vista . . . 93.5
Pulver . . . 48.1	Granite . . . 111.1
Hartsel . . . 63.5	Leadville . . . 135.2

Leadville-Glenwood Springs.

Miles	Miles
Leadville . . . 0.0	Wolcott . . . 48.3
Pando . . . 16.0	Gypsum . . . 65.8
Redcliff . . . 22.6	Glenwd. Springs . . . 90.8

Glenwood Springs-Rangely.

Miles	Miles
Glenwd Springs . . . 0.0	Meeker . . . 75.9
Rifle . . . 33.4	Rangely . . . 136.9

Rangely-Colton.

Miles	Miles
Rangely . . . 0.0	Roosevelt . . . 89.7
K Ranch . . . 22.0	Duchesne . . . 121.9
Vernal . . . 57.3	Colton . . . 172.5

Colton-Salt Lake City.

Miles	Miles
Colton . . . 0.0	Provo . . . 57.8
Thistle . . . 33.7	Alpine . . . 71.5
Spanish Forks . . . 47.0	Salt Lake City . . . 103.1

Salt Lake City—Snowville.

Miles	Miles
Salt Lake City . . . 0.0	Honeyville . . . 73.9
Ogden . . . 37.9	Blind Springs . . . 89.8
Brigham City . . . 60.1	Snowville . . . 117.3

Snowville-Wells.

Miles	Miles
Snowville . . . 0.0	Montello . . . 111.6
Lucia . . . 94.2	Wells . . . 166.2

Wells-Battle Mountain.

Miles	Miles
Wells . . . 0.0	Carlin . . . 79.6
Deeth . . . 20.5	Richmond Mine . . . 96.9
Elko . . . 56.4	Battle Mtn . . . 133.0

Battle Mountain-Lovelock.

Miles	Miles
Battle Mtn . . . 0.0	Mill City . . . 85.6
Goconda . . . 40.0	Humboldt . . . 99.2
Winnemucca . . . 57.0	Lovelock . . . 132.4

Lovelock-Truckee.

Miles	Miles
Lovelock . . . 0.0	Verdi . . . 119.7
Wadsworth . . . 75.8	Truckee . . . 143.1
Reno . . . 107.8	

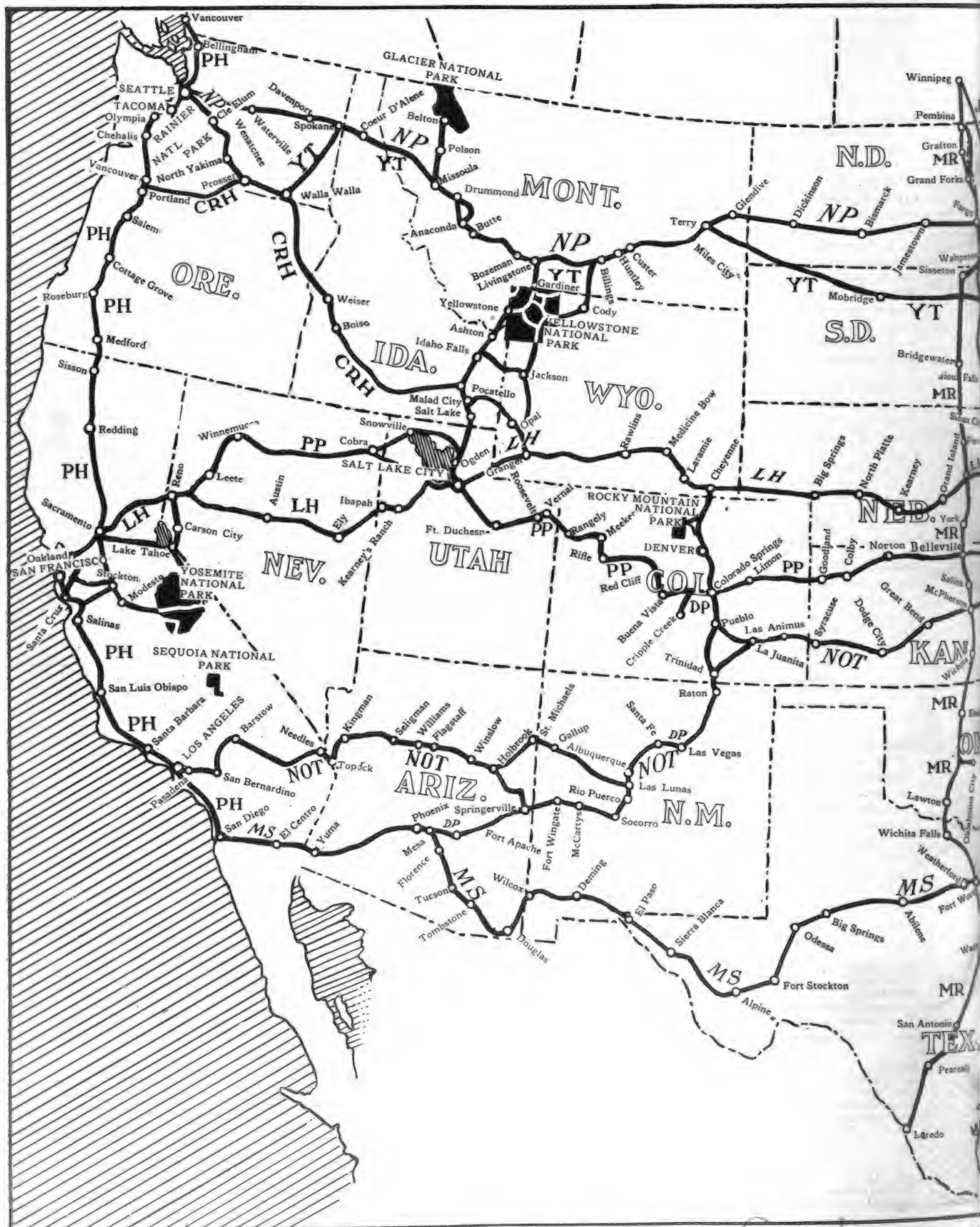
Truckee-Sacramento.

Miles	Miles
Truckee . . . 0.0	Auburn . . . 76.5
Emigrant Gap . . . 32.6	Folsom . . . 95.6
Colfax . . . 58.5	Sacramento . . . 117.4

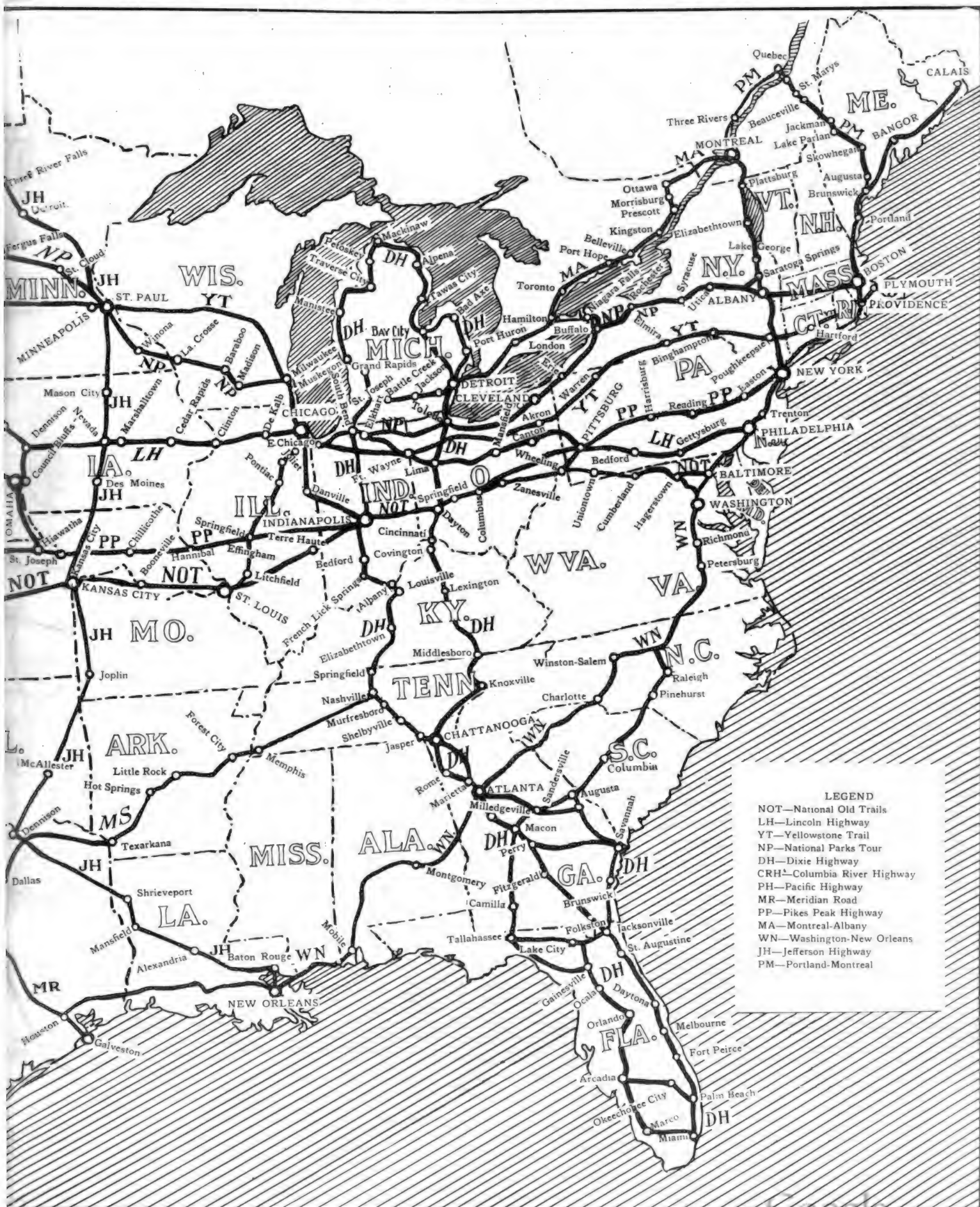
Sacramento-San Francisco.

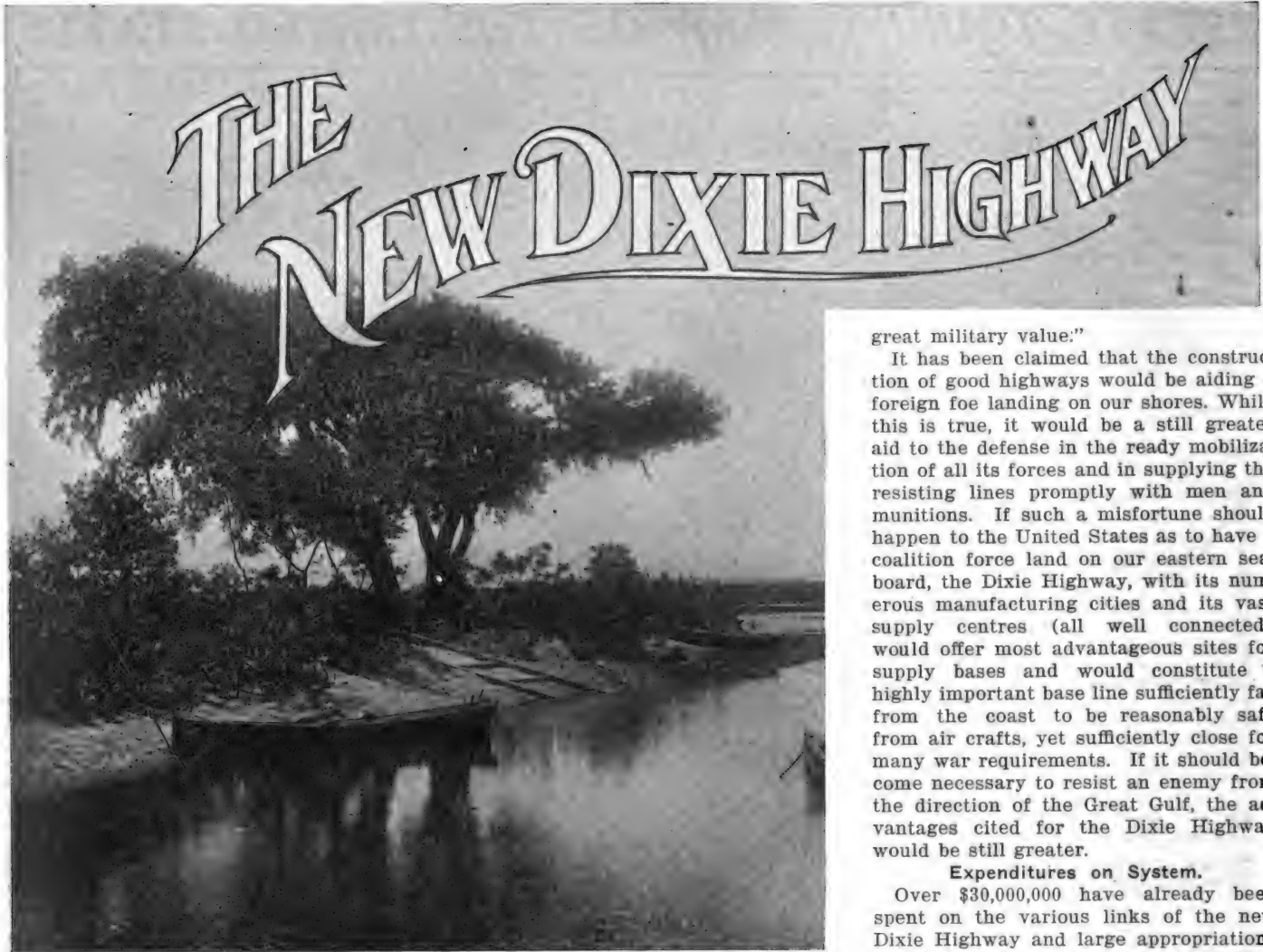
Miles	Miles
Sacramento . . . 0.0	Livermore . . . 95.1
Lodi . . . 34.6	Oakland . . . 130.7
Stockton . . . 52.4	San Francisco . . . 136.3

1917 TRANSCONTINENTAL, MERIDIONAL, AND SPECIAL



INTERSTATE TOURING MAP OF THE UNITED STATES





UNITING THE NORTH AND SOUTH

SECOND in importance only to the tours on the big transcontinental highways are the many which will follow in some part along the big Dixie Highway system, which encircles the great state of Michigan, where the majority of all the automobiles used in the world are made, and taps the rich industrial centres of Illinois, Indiana and Ohio, passing southward to Florida, where it terminates at Miami after passing through the world famous winter resorts of that state on the Atlantic ocean.

Throughout its entire length this highway system is backed and encouraged by an enthusiastic organization which has been responsible for its marvelous high state of development and progress. It has been pronounced by many army officials as of incalculable value to the country in case of war. Lieut. Col. Henry T. Allen of the Eleventh U. S. Cavalry, who has traveled extensively in other countries and an author of prominent military works, in speaking of the highway said:

"In the Dixie Highway we find a magnificent line from Chicago through manufacturing centres, including Indianapolis, Louisville, Nashville, Chattanooga, At-

lanta and Tallahassee; another line from the very heart of the Great Lakes, Mackinaw, through the following important cities: Detroit, Toledo, Dayton, Cincinnati, Knoxville, Chattanooga, Atlanta, thence to Jacksonville. In a word, the Great Gulf and the Great Lakes are joined by a wonderful highway passing through a section of the country that has always furnished more than its quota of soldiers for every war in which the nation has been engaged. Due to its geographical position, its population, its food production and its manufacturing capacity, this section may well be considered the greatest military asset of any large part of the United States.

Of Military Importance.

"Probably no branch of the government is more keenly interested in the completion of the Dixie Highway than the army, and to no branch can it have a more important bearing. With the inevitable change in our military policy, involving the concentration and organization in time of peace of such commands as would be required in war, the country between the Lakes and Florida will have an added military interest in which the Dixie Highway will prove its

great military value."

It has been claimed that the construction of good highways would be aiding a foreign foe landing on our shores. While this is true, it would be a still greater aid to the defense in the ready mobilization of all its forces and in supplying the resisting lines promptly with men and munitions. If such a misfortune should happen to the United States as to have a coalition force land on our eastern seaboard, the Dixie Highway, with its numerous manufacturing cities and its vast supply centres (all well connected) would offer most advantageous sites for supply bases and would constitute a highly important base line sufficiently far from the coast to be reasonably safe from air crafts, yet sufficiently close for many war requirements. If it should become necessary to resist an enemy from the direction of the Great Gulf, the advantages cited for the Dixie Highway would be still greater.

Expenditures on System.

Over \$30,000,000 have already been spent on the various links of the new Dixie Highway and large appropriations for further improvements and betterments have been secured from the different states and counties through which it runs.

The system of roads embraced in this highway extends from Miami, Fla., to Mackinaw, Mich., and at both extremes and in the central section the work of construction and promotion is being prosecuted with enthusiasm such as has never before been connected with a good roads movement. In location it has the same relation to the people living in the North and South, east of the Mississippi, as the two transcontinental highways have to the automobilists of the East and West. While primarily for the purpose of providing ideal touring conditions between the Gulf of Mexico and the Great Lakes, and to promote interchange of industrial products between the people of the North and South, it has an inestimable industrial value, as well as great strategical value in case of war.

In Michigan the great link of the Dixie Highway, which encircles the state's borders, is being fostered by the Good Roads Committee of the Detroit Board of Commerce, which includes some of the best known men in the automobile trade.

While this work is going on steadily in the northern end of the system, the southern extension into Florida is being rapidly developed. In the latter state a new link is under construction, it forming one of the most unique road projects

ever attempted in this country. This is a new route from Arcadia to Miami, Fla., over the Tamiami trail.

Long Reaches of Good Roads.

At present the trip from Chicago to Miami, Fla., can be made over good roads the entire distance, as routed in the accompanying itinerary, but when the entire system, as shown on the map, is completed it will form a highway which will be without a peer in the world for scenic beauty and variety of climate.

After passing around the State of Michigan, on the shores of Lakes Erie, Huron and Michigan, through forests of gigantic trees and into the centre of the automobile industry of the world, the highway strikes into that rich and fertile territory occupied by Ohio, Indiana and Kentucky. In Tennessee the environment becomes more mellow and the foliage along the roadside suggests the southern climate, while in the southern section of Georgia and in Florida the tourists see an indication of the tropics, the abundant efflorescence of the plants, shrubbery and trees making a sharp contrast to the type of country passed through on the first part of the tour. From the cold, chilly winds of Mackinaw straits the tourist experiences every climatic condition prevailing in the United States until the arrival at Miami, where it is summer time the year around.

Florida Enchantments.

The method of travel through this great state today is in sharp contrast to that employed by Hernando de Sota when he made his memorable explorations through its vastness centuries ago, fighting Indians part of the time and suffering severe hardships all the time. A good, and in some places, excellent highway system takes the motor car tourist from the northern part of the state down either the east or west coast through a scenic splendor that would lead one to believe he were in Central America rather than in one of the United States. Almost without interruption the tourist is flanked by dense forests of palms and



Skirting Mackinaw Straits, on Mackinac Island, Michigan.

slender pines from which droop festoons of gray vines and creepers.

Should the tourist cross the state from Miami to Marco he would follow the Tamiami trail, which has been described in the foregoing. Here only the other day geologists revealed the antiquity of Florida, unearthing the human remains lived there from 10,000 to 20,000 years ago.

The itinerary given with this tour takes the tourist from Miami back to Jupiter and then westward to Arcadia through the great central lake region of Florida than which there is no more interesting section in this country. He will also find himself on the west coast in Florida's rightly famous citrus fruit district. Northward is Tampa, one of the most enterprising metropolises in the state. Tampa claims that a greater mileage of good roads radiate from that city than any other centre in the State of Florida.

ITINERARY. THE DIXIE HIGHWAY.

Night Stops—Chicago, Indianapolis, Louisville, Ky.; Nashville, Chattanooga, Atlanta, Macon, Jacksonville, Miami, Gainesville, Tallahassee, Macon, Knoxville, Cincinnati, Toledo, Detroit, Traras City, Mackinaw, Muskegon, South Bend.

Chicago-Danville, Ill.

Miles		Miles
Chicago	0.0	Watseka 84.2
Chicago H'ghts	28.8	Hoopeston 107.2
Momence	54.0	Danville 135.8

Danville, Ill.-Indianapolis, Ind.

Danville	0.0	Brownsburg .. 74.6
Covington, Ind. 12.8		Indianapolis .. 88.9

Indianapolis-Dayton, O.

Indianapolis ..	0.0	Eaton, O. 84.6
Knightstown ..	34.2	Dayton 108.6
Richmond, Ind.	68.8	

Indianapolis-Louisville, Ky.

Indianapolis ..	0.0	Bedford 77.4
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Rounding a Curve on Well Maintained Highways in the Vicinity of Savannah, Ga., Which Motorists Find a Delightful Path from End to End.



Falls in a Babbling Brook on the Heights of the Cumberland Range, on the Dixie Highway, Near Seawaneec, Tenn.

Martinsville ...	30.7	Paoli	101.0
Bloomington ..	52.8	Louisville	147.6

Louisville-Nashville, Tenn.

Louisville	0.0	Cave City.....	134.1
Elizabethtown..	45.3	Russellville	194.0
Mumfordsville..	76.6	Nashville	249.3

Nashville-Chattanooga.

Nashville	0.0	Pelham.....	80.4
Laverne	15.7	Tracy City....	93.9
Murfreesboro..	31.3	Sequatchie	110.3
Beach Grove....	49.0	Jasper	114.2
Manchester....	63.1	St. Elmo.....	137.3
Hillsboro	71.4	Chattanooga ..	140.1

Chattanooga-Atlanta, Ga.

Chattanooga... 0.0	Marietta	120.7
Summersville.. 45.1	Atlanta	139.0
Rome..... 70.5		

Atlanta-Milledgeville.

Atlanta..... 0.0	Madison	70.8
Decatur..... 6.6	Eatonville	94.7
Stone Mountain 16.6	Milledgeville ..	116.3

Atlanta-Macon, Ga.

Atlanta	0.0	Forsyth	69.3
Griffin	39.8	Macon	94.5

Macon-Jacksonville, Fla.

Macon	0.0	Waycross	174.3
Perry	28.2	Jacksonville ..	254.8
Fitzgerald	95.7		

Jacksonville-Miami, Fla.

Jacksonville... 0.0	Melbourne ....203.3
St. Augustine.. 39.8	Fort Pierce...252.1
Hastings..... 53.3	W. P'm Beach.311.9
Dayton .....113.2	F. Lauderdale.354.0
Titusville ....161.9	Miami .....381.9

Miami-Jupiter, Fla.

Miami	0.0	W. P'm Beach..	69.1
F. Lauderdale.. 26.1	Jupiter	85.9	

Jupiter-Arcadia, Fla.

Jupiter	0.0	Arcadia	144.5
Okeechobee.... 54.5			

Arcadia-Gainesville, Fla.

Arcadia	0.0	Leesburg	167.6
Bartow	52.5	Ocala	205.9
Oriando	116.0	Gainesville	249.8

Gainesville-Tallahassee.

Gainesville ...	0.0	Perry	118.4
Newberry	26.0	Simmons	139.4
Trenton	40.3	Lamont	150.9
Mayo	83.0	Tallahassee ..	181.4

Tallahassee-Jacksonville.

(Connecting Link.)

Tallahassee ...	0.0	Live Oak	83.4
Monticello	21.1	Lake City	108.6
Madison	54.2	Jacksonville ..	169.8

Tallahassee-Macon, Ga.

Tallahassee...	0.0	Americus	129.1
Thomasville...	34.3	Ft. Valley.....	174.7
Camilla	66.5	Macon	201.5
Albany	92.2		

Macon-Atlanta, Ga.

Macon	0.0	Griffin	54.7
Forsyth	25.2	Atlanta	94.5

Atlanta-Chattanooga, Tenn.

Atlanta	0.0	Dalton	90.2
Cartersville ... 41.3	Chattanooga ..	124.6	

Chattanooga-Knoxville, Tenn.

Chattanooga... 0.0	Kingston.....	84.0
Dayton..... 38.9	Knoxville	131.5

Knoxville-Cincinnati, O.

Knoxville.....	0.0	Berea	168.6
Cumb'land Gap	67.6	Richmond	183.3
Middlesboro ...	71.4	Lexington	209.1
Barboursville..	99.1	Georgetown ...	218.0
Corbin	116.1	Williamstown ..	252.5
London	132.6	Covington	289.6
Mt. Vernon....	148.6	Cincinnati	290.5

Cincinnati-Toledo, O.

Cincinnati.....	0.0	Sidney	96.6
Middletown....	33.0	Lima	132.0
Dayton	56.1	Findley	164.3
Troy	76.2	Bowling Green ..	187.2
Piqua	84.2	Toledo	210.0



Apex Mark of the Dixie Highway, a Pyramid Made of Mortar and Native Stone at the Northern Terminus, Mackinaw City, Mich.

Toledo-Detroit, Mich.

Toledo.....	0.0	Old Port	29.9
LaSalle	16.2	Wyandotte	46.7
Monroe	20.7	Detroit	58.4

Detroit-Mackinaw, Mich.

Detroit	0.0	Alpena	271.2
Flint	68.9	Onaway	340.0
Bay City..... 118.3	Mackinaw	382.7	
Tarvas City... 196.8			

Mackinaw-South Bend, Ind.

Mackinaw.....	0.0	Grand Haven..	251.8
Petosky.....	38.3	Grand Rapids..	282.0
Travers City..	108.9	Kalamazoo	331.6
Manistee	141.4	South Bend....	400.7
Muskegon	238.8		

South Bend-Indianapolis, Ind.

South Bend...	0.0	Logansport....	68.7
Plymouth	23.4	Indianapolis ..	135.9
(Cross route from Macon, Ga., to Jacksonville, Fla., via Savannah, Ga.)			

Macon, Ga.-Jacksonville, Fla.

Macon..... 0.0	Savannah	207.5
Milledgeville.. 30.0	Riceboro	242.1
Waynesboro .. 112.7	Brunswick	253.4
Springfield ... 181.3	Jacksonville ..	373.7



The Famous Palm Drive Terminus of the Dixie Highway on the Southern End, the Picturesque Stretch Entering Miami, Fla.

THOUSANDS TOUR TO PLATTSBURG CAMP

Great American Training School for Officers the Objective of a Great Many Motor Trips Through the Hudson Valley

PLATTSBURG, the military training camp on the shores of Lake Champlain, where future officers of the American Army are in the making, was a popular touring point last summer, but with the added interest in the camp this year accruing from the fact that the men now in training there are to man an army to cross the seas, thousands of motorists are constantly attracted to the place.

Touring conditions up the valley of the beautiful Hudson from New York City are as nearly ideal as could be wished for, which is an additional reason why thousands of cars can be found daily upon the routes paralleling the river either enroute for Plattsburg or on the return trip.

It can be reached from almost any part of New England, New York state or Canada by direct routes, but the most interesting and pleasureable route is that from New York City.

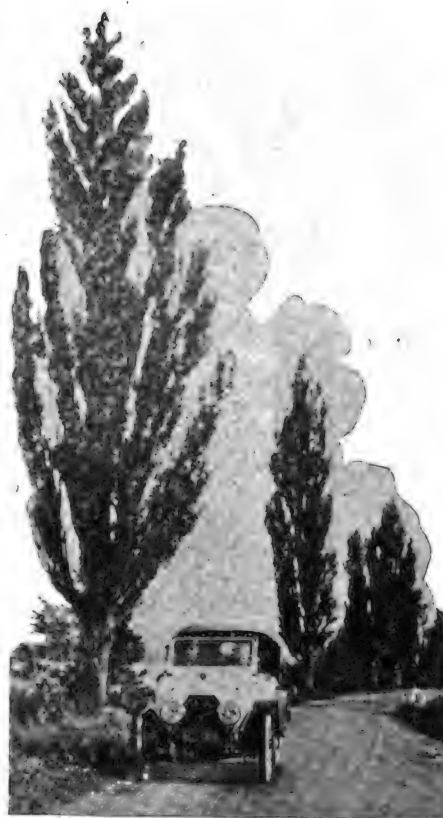
The accompanying itinerary of the route from New York to the training camp indicates the mileages on the east side of the river going and it is under-

stood from those who have recently made the trip that the roads on this route are in excellent shape, with the exception of one or two short detours. On the western bank the routes followed are more irregular, but to the enthusiastic tourist some rough going will always be acceptable where the route lays through a section affording new scenery or points of interest.

Because almost all interests are military now, Plattsburg as a motor trip objective has all the more zest if it happens that one of the family or a friend is there in training to be an officer.

This route lies in the beautiful Hudson valley on the east shore to Rensselaer, where a crossing is made into Albany. From there the road goes along the west bank of the Hudson, passing Saratoga lake into Saratoga Springs, which for many years was the leading inland watering place of the United States. The springs for which the place became famous, about 30 in number, were known to the Indians centuries ago. Saratoga is also known as the gateway of the Adirondacks, where thousands of New Yorkers go every year for hunting, fishing and camping.

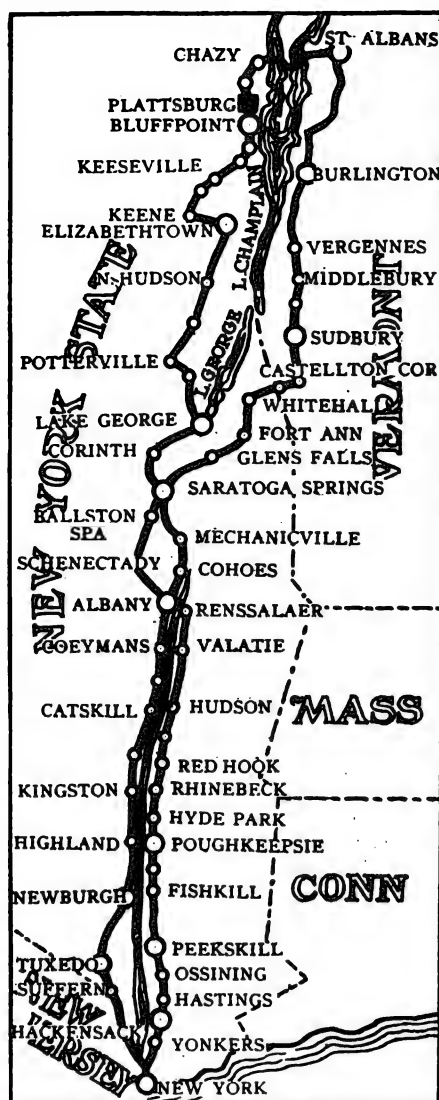
Continuing in a northerly direction the route runs into that scenic section of Vermont laying along Lake George and Lake Champlain, and passing



Soon to See the Boy Who Is to Be a Soldier.



Along Ausable River, Near Plattsburg and Lake Champlain; Above, the Lake Shore Drive Leading Past Lake George Toward the Military Training Camp.



The Tourists' Route Map.

through Sudbury, Vergennes, Burlington and St. Albans. From the latter place a part land and part water route is taken over to Chazy on the west bank of Lake

Champlain, which is an excellent trip. Foothills of the Adirondacks.

The tourist is now within a few miles of the beautiful camping grounds on the shore of the lake and in the foot hills of the Adirondack mountains. The camp overlooks Cumberland bay and was started three years ago as a training grounds for business men who wished to become proficient in the manual of arms. Only about 1000 attended the camp in 1915, while last year more than 7000 participated in the drilling manoeuvres there.

The gathering at Plattsburg has been of the most cosmopolitan character, bankers, millionaires, scientists, professors and professional men drilling shoulder to shoulder with clerks, students and men from the laboring ranks. Manoeuvring across the training field under the direction and instruction of the U. S. army officers, this body of citizen soldiery, in the making, is one of the most impressive sights in America today. Practically every one of the men gathered at the camps are new to the manual of arms and few, if any, ever shot off a regulation army rifle before; but they show the greatest enthusiasm and go through the drills, which are really hardships to many, owing to their poor physical condition, without flinching.

This aggregation of men from all walks of life shows that the spark of patriotism is still strong in all Americans. Upon only a slight hint of the possibilities of warfare, they at once left their work, and in some cases, a life of ease,

to go to Plattsburg and undergo the strenuous ordeal of military training. A redeeming feature of the training, however, is the splendid drilling ground and location of the camp, on a spot that would be selected by many if one were seeking a retreat by the lake-side or mountain foothills in which to pass the summer.

The environment of the camp is most inspiring and healthful, and the sanitary arrangements are ideal, they being under the direction of U. S. army engineers. From present indications, the encampment will be continued next year.

The return trip is made southward through the eastern fringe of the Adirondacks and lays through a country that for scenic grandeur and beauty has no equal in this country. The mountains stretch out in long chains, breaking up the horizon on the west, while to the eastward lies a net work of lakes and streams which as a whole resemble a gigantic park system. In the fall of the year the ride down through Elizabethtown to Lake George is enchanting. The atmosphere has a noticeable crispness and is clear and dry, which, combined with the scent of the mountain air and turning foliage, creates an environment that is greatly exhilarating.

Lake George is at the southern ex-



An Angler's Paradise in the Foothills of the Catskills.

tremitly of the lake by that name and has figured prominently in American history for nearly 300 years. Fr. Isaa Jogues, a French priest, discovered the lake in 1642 and he was killed there by the Iroquois Indians in 1646. General Johnson, who camped at its head in 1755, gave the lake its present name in honor of British King, George the Second. It has often been called Horicon, as this name was used in referring to it by James Fenimore Cooper in his famous stories, which were based on Indian life and settlements about the lake. It was also the scene of battles between the French and English and the French and Indians.

Reminders of the Revolution.

The ruins of Fort George, which was built in 1759 by Amherst, still stand in the state park east of the railway station in Lake George. During the revolutionary war the fort was used by an English command as a military post until Col. Bernard Romans captured it in 1775. The spot is now marked by a battle monument erected there in 1903 by the Society of Colonial Wars to commemorate the event.

The country is rich in historic lore, as well as impressive and beautiful scenery. The route from Lake George to Saratoga lies through Corinth, a picturesque town, and also intersects several small villages. From this point the same route as was taken on the trip up from Albany may be followed in returning. Another way, slightly longer, passing through



Trees and Lakes Combine to Make Beautiful Scenery.

Ballston Spa and Schenectady, offers the tourist scenery and points of interest that warrant the extra driving. At Schenectady are the great works of the General Electrical Company and a number of other thriving industries.

Entering Albany the tourist should continue on through Central avenue on to State street as far as the State capitol, which is one of the finest specimens of French renaissance style in America. The building was in the course of erection for over 30 years, during which time more than \$25,000,000 was spent upon it.

100 Miles Along the Hudson.

From Albany to New York City the road runs close to the west bank of the Hudson river for nearly 100 miles into Newburgh, and through a section that became famous in Colonial times owing to its close identification with the movement of the Continental armies. Kingston, one of the places passed through on this leg of the tour, was the first place of meeting of the New York state legislature in 1676. It was burned by the British in 1777.

Newburgh, the last stop before winding through New Jersey to the New York ferry, is situated in a wonderful location on the banks of the Hudson and presents a grand picture from the river, with the water in the foreground and the mountains in the distance. It was settled by refugees from the Franco-German war in 1708 and was named Newburgh in

and where Peter Townsend forged the chain that was stretched across the river to prevent the British ships from sailing past the city.

Polopel Island, which was a famous military prison during the war for freedom, is nearby on the river, as are many other famous land marks that were better known over 100 years ago than they are to the present generation. The old court house, which is opposite the hotel, is one of the imposing specimens of architecture of which there are quite a number. A fine view of the surrounding country may be obtained from the observatory in Downing park, and the tourist will find a visit to the Temple Hill monument very interesting. It marks the site of the general headquarters and the temple in which the society of the Cincinnati was first organized and where the first meeting of that famous organization was held.

The tourist who is well posted on Revolutionary war history will enjoy this section of his trip more than any other part and can spend a long time in delving into the archives that are available, in addition to sight seeing among the historic spots so closely identified with the nation's birth. In an environment of this nature the joys of touring are multiplied, the water and land scenery having twofold interest on account of its historic connections.

Out of Newburgh the road runs along the route of the Erie railroad and the Ramapo river into Tuxedo, where there is a colony of very wealthy New York people, who maintain many palatial residences about the city and Tuxedo lake. The route continues along the west bank of Ramapo into Hillburn, where a bridge is crossed leading into Suffern, the last place in New York state. The remainder of the trip is through Ridgewood and Hackensack, N. J., to Edgewater, where the ferry, which runs every 20 minutes, is taken for 130th street, New York City.

Generally speaking, this trip should not require more than a week from start to finish, allowing for a day at Plattsburg, or any other place the motorist may choose. The total mileage for the round trip is approximately 712 miles, the outward journey being about 369 miles and the return 343 miles.



Anthony's Nose and Rogers' Rock on Lake George.

ITINERARY.

New York-Poughkeepsie.

Miles	Miles
New York..... 0.0	Peekskill .....40.6
Yonkers .....12.7	Cold Spring....52.0
Irvington .....20.4	Fishkill .....59.8
Tarrytown .....23.1	Wappinger's ...67.4
Ossining .....29.3	Poughkeepsie ..74.8

Poughkeepsie-Albany.

Poughkeepsie .. 0.0	Stuyvesant F. ....50.0
Hyde Park..... 6.1	Kinderhook ....53.8
Rhinebeck .....16.2	Schoodack .....67.3
Red Hook.....22.1	E. Greenbush...69.0
Blue Stores....31.1	Rensselaer ....73.5
Hudson .....41.3	Albany .....74.5

Albany-Saratoga.

Albany 0.0	Mechanicville ..22.6
Cohoes .....12.1	Maltaville .....28.7
Waterford .....14.0	Saratoga .....39.0

Saratoga-Sudbury.

Saratoga 0.0	Whitehall .....43.1
Glens Falls....19.0	Fairhaven .....53.6
Sandy Hill....22.7	Castleton Cor...57.0
Kennedy .....27.2	Sudbury .....61.0

Sudbury-Burlington.

Sudbury 0.0	Shelburne .....41.0
Cornwall .....10.7	Burlington ....47.9
Vergennes .....25.9	

Burlington-St. Albans.

Burlington 0.0	Milton .....16.0
Winooski 3.0	Georgia .....22.0
Colchester 8.0	St. Albans.....28.0

St. Albans-Plattsburg.

St. Albans..... 0.0	Isle La Motte..26.0
Swanton 9.0	Chazy Landing..28.0
Swanton Ferry.18.0	Ingraham .....34.2
Albany Centre..21.5	Plattsburg .....43.0

Plattsburg-Elizabethtown.

Plattsburg 0.0	Upper Jay.....37.3
Keeseville ....15.8	Keene .....43.4
Ausable .....27.6	Hull Corners...45.4
Jay .....33.6	Elizabethtown..56.1

Elizabethtown-Saratoga.

Elizabethtown.. 0.0	Warrensburg ...62.8
Scroon River...22.6	Lake George...69.3
Pottersville ...41.2	Glens Falls....79.3
Chestertown ...50.1	Saratoga .....97.5

Saratoga-Albany.

Saratoga 0.0	Schenectady ...22.6
Ballston 6.7	Albany .....37.6
Burnt Hills....14.3	

Albany-Kingston.

Albany 0.0	Evesport .....44.7
Coeymans .....13.4	Saugerties ....47.9
Coxsackie ....24.6	Glenrie Falls...50.7
Catskill .....35.9	Kingston .....59.6

Kingston-Newburgh.

Kingston 0.0	Marlboro .....26.3
Ulster Park.... 7.5	Newburgh .....34.9
Highland .....17.8	

Newburgh-New York City.

Newburgh 0.0	Ramapo .....31.0
Vails Gate..... 4.8	Suffern .....32.9
Highland Mills.13.5	Hohokus .....41.7
Southfield ....21.7	Hackensack ....51.4
Tuxedo .....26.4	130th St. Ferry.58.2



Such Scenes as This Abound in the Catskills.

1743. The old Hasbrouck house, which was used by Gen. Washington as headquarters in 1782-83, is the principal point of interest in the city and is visited by hundreds of tourists. The "Tower of Victory," which was erected to commemorate the close of the Revolutionary war, stands in the park that was formerly the grounds of the Hasbrouck house. From this point Beacon Hill, on the other side of the Hudson, may be seen. A monument now marks the spot on the hill where fires were burned during the Revolutionary war. There are numerous other points of historic interest about Newburgh, including the Old Mansion, where the "Dutch loan" was deposited

VALLEYS OF THE APPALACHIAN MOUNTAINS

Beautiful Summer Driving Climate in the Alleghenies, Catskills, Adirondacks and Around Famous Lake Shores

WHEN the sweltering sun throws out its penetrating rays for the first time in the summer, the motorist's thoughts revert to scenes of cool breezes in mountain canyons and valleys and along the shores of lakes and rivers where the stifling heat of the city and sea shore is never known.

Such driving conditions are found in reality in a tour through the eastern mountains, from New York City through the northern border of Pennsylvania along the Delaware river, the Catskills and Adirondack mountains. Through the Jersey cities of Newark, Madison and Morristown modern boulevards are traversed. From Norristown, historically renowned as the winter quarters of General Washington during the winter of 1779-80, the road ascends Schooley's mountain, which was once a popular summer resort, overlooking the Musconetcong and German valleys.

Down the western slope of the mountain the road leads into Hackettstown, continuing on to the Delaware river, which is crossed by ferry. Following along the west bank of the river, the route leads into the Delaware Water Gap, a famous summer resort in the Allegheny mountains.

Going over the route from the gap to the summit of Mt. Pocono and across the Pocono mountain plateau, the scenery is exceptionally fine. The descent of the mountains begins a short distance be-



Mountain Glens in the Adirondacks Duplicate This Pretty Waterfall Many Times.

yond this point and the route lays over a fine boulevard into Scranton, the centre of the anthracite mining regions of Pennsylvania.

Up through valleys, walled in by wooded mountains, the road runs back into New York state and on

to Binghamton. Passing out of this city through the Susquehanna river valley the country takes on an agricultural aspect.

All along the highways to Watkins Glen, which is nationally famous for its scenic beauty, there are many places of interest and continuing on through the lake country, along the south shore of Canandaigua lake and through the basin of Otsego Lake, the foliage is dense and beautiful.

From Cooperstown the route skirts the shores of Otsego Lake and passes over the hills into the Mohawk Valley at Fort Plain. The drive through the valley and up the steep hill to Ballston Spa is considered one of the finest routes in New York state. It is a short trip to Saratoga Springs, which was once the most popular resort in America, and Lake George is reached over an excellent stretch of highway.

The return trip is made over the same route back as far as Ballston Spa, thence to Schenectady and Albany. From this point down the Hudson valley the route is similar to that given in the Plattsburg tour, which also contains a description of the topographical features and points of interest.

ITINERARY.

EASTERN MOUNTAINS.

Night Stops—Delaware Water Gap, Penn.; Watkins, Cooperstown, Sagamore, Albany and New York. Seven Days, 730.8 Miles.

New York-Delaware Water Gap.

Miles		Miles	
Weehawken		Hackettstown	53.8
Ferry	0.0	Danville	59.2
Newark	10.6	Buttsville	65.5
Irvington	12.9	Bridgeville	66.7
Madison	23.9	Delaware	72.3
Morristown	30.2	Myers Ferry	72.7
Mendham	37.1	Portland, Penn.	75.6
Chester	42.7	Delaware Water Gap	80.9
German Valley	47.4		

Delaware Water Gap-Binghamton.

Miles		Miles	
Delaware Water Gap	0.0	Wallsville	66.8
Stroudsburg	3.6	Glenwood	73.1
Mt. Pocono	19.9	Hartford	83.4
Tobyhanna	24.9	New Milford	86.6
Gouldsboro	30.5	Broad Bend	
Scranton	52.7	Penn.	87.4
		Kirkwood, N. Y.	103.0



Delaware Water Gap, Looking Up River from Heights Above Kittatinny Hotel.

Providence 55.5 Binghamton 112.0
Clark's Summit 60.3

Binghamton-Watkins Glen.

Miles	Miles
Binghamton ... 0.0	Cayuta 56.9
Vestal 10.3	Alpine 59.9
Owego 24.6	Odessa 64.0
Candor 35.1	Watkins Glen ... 70.1
Van Etten 47.0	

Watkins Glen-Cooperstown.

Miles	Miles
Watkins Glen ... 0.0	Truxton 60.8
Montour Falls ... 2.8	De Ruyter 69.0
Odessa 6.0	Ostelle 79.6
Alpine 9.9	Smyrna 88.2
Ithaca 27.7	Edmeston 106.2
Varna 31.6	Burlington 112.9
Willow Glen ... 36.8	Fly Creek 120.5
Dryden 39.3	Cooperstown ... 126.2
Cortland 49.4	

Cooperstown-Sagamore.

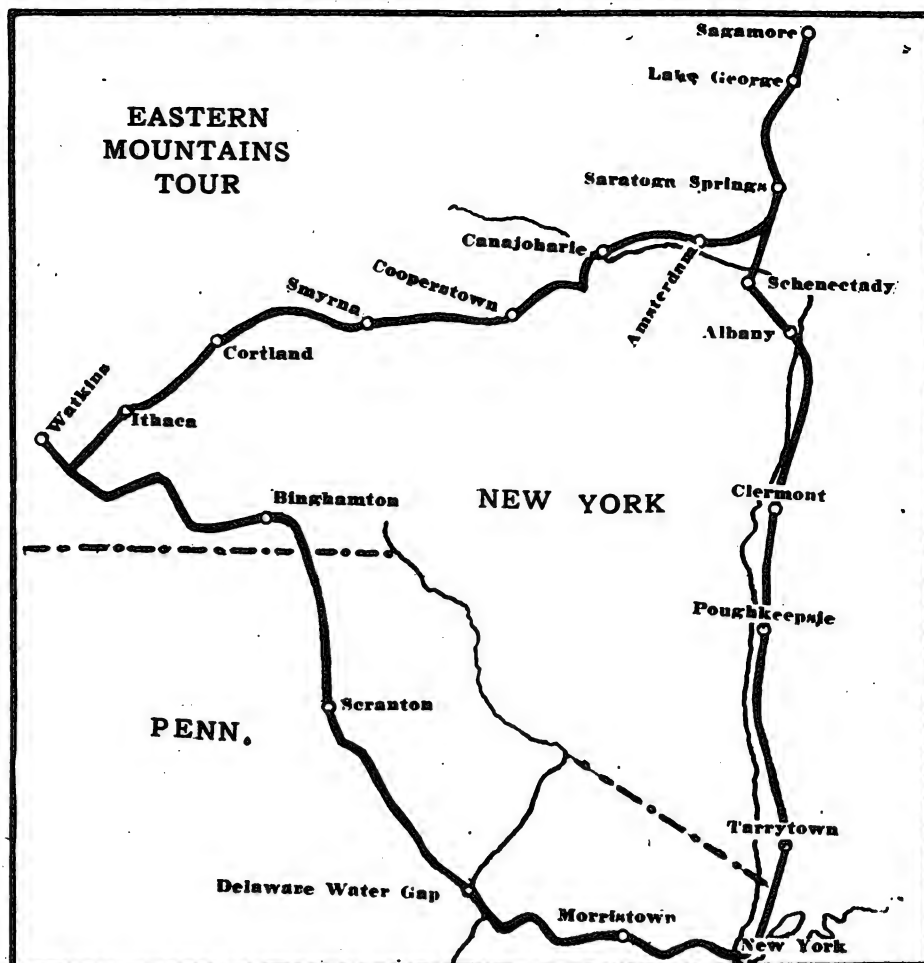
Miles	Miles
Cooperstown ... 0.0	Tribes Hill 55.5
Springfield ... 10.3	Amsterdam 57.3
Cherry Valley ... 16.9	Ballston 79.5
Sharon Springs ... 24.5	Saratoga 86.2
Ames 28.2	S. Glens Falls ... 104.6
Canajoharie ... 34.7	Glens Falls 105.3
Palatine Bridge ... 35.2	Lake George 114.4
Fonda 46.6	Sagamore, N. Y. 120.4

Sagamore-Albany.

Miles	Miles
Sagamore 0.0	Ballston 41.0
Lake George ... 6.0	Burnt Hills 48.6
Glens Falls ... 15.2	Schenectady 56.9
S. Glens Falls ... 15.9	Albany 71.9
Saratoga 34.3	

Albany-New York City.

Miles	Miles
Albany 0.0	Hyde Park 68.5
Rensselaer ... 1.0	Poughkeepsie ... 74.5
Schoadack Cen-ter 7.2	Wappinger Falls ... 82.2
Kinderhook ... 20.6	Hughsonville ... 83.6
Stuyvesant ... 24.4	Fishkill Landing ... 89.7
Falls 24.4	Cold Spring 96.7
Stockville ... 29.7	Peekskill 108.7
Hudson 33.1	Croton-on-Hud-son 117.3
Blue Stores ... 43.3	Ossining 120.0
Upper Red Hook 49.8	Tarrytown 125.2
Red Hook 52.3	Yonkers 137.4
	New York, N. Y. 149.3



Map Showing a Triangular Tour of Eastern Mountains on the Appalachian Chain.
For Road Connections See Master Map.

NEW JERSEY'S FAMOUS SUMMERING PLACES

Along the Sea Coast to Atlantic City, America's
Most Popular Bathing Resort for Vacationists

ARRIVING in New York from New England, the West or South, the tourist who has been used to mountain scenery or wooded country,

will find, in seeking a change of environment, a very interesting and delightful trip through New Jersey to Atlantic City, America's foremost summering

place, and return to New York via Philadelphia.

Leaving New York, the ferry may be taken over to Jersey City and a run made down to South Amboy through Newark, Elizabeth and Perth Amboy, or South Amboy may be reached by ferrying over to Staten Island and ferrying again to the mainland.

The route from South Amboy follows the shores of Raritan bay to Keyport. An imposing granite monument, near Freehold, commemorates the battle of Monmouth, fought June 28, 1778.

Nearly all the places through which the tourist passes are famous resorts, and in many are located the great estates of well known people. Red Bank is a famous yachting place and Long Branch, which was once the leading summering place of the country, was the summer capital during General Grant's administration.

Lakewood, situated among the Jersey Pines, is not only a popular summer and winter resort, but is famous for its many



Bathing Hour on the Beach at Atlantic City, Where Thousands Disport in Surf.

palatial residences, including that of George Gould at Georgiana court, where the famous Lakewood golf links are laid out.

Upon arriving at Atlantic City the tourist upon his first visit to this mecca of vacationists and pleasure seekers, will be astounded at the many thousands of people who gather there at this season of the year to disport themselves in the ocean and in the casinos and pleasure places. This city, which has only a few thousand native residents, has a floating population during the summer months of 250,000 to 300,000 people. This enormous crowd is accommodated in the 1000 odd hotels that line the coast of Absecon island, on which Atlantic City is built. In front of these great hostelrys the famous board walk runs along the beach for about two miles. There are also five great pleasure piers extending out into the sea.

Cape May, a short half a hundred miles further on along the coast, is also one of the favorite gathering places for pleasure seekers from New York City and all over the eastern seaboard. It is situated on the tip end of southern New Jersey's stretch of sands and is quieter than crowded resorts more readily accessible to the great seaboard cities. Turning back northward and then westward the run to Philadelphia is through a famous section of the state, notable for its productive gardens, canneries and commerce in fruits and vegetables. The tour terminates in the famous hospitable city of Brotherly Love.

ITINERARY. NEW YORK-PHILADELPHIA.

Night Stops—New York City, Atlantic City and Cape May, N. J.; Philadelphia, Penn. Three Days, 288.1 Miles.

New York-Atlantic City.

Miles	Miles
New York..... 0.0	Avon..... 66.7
Newark..... 8.9	Belmont..... 67.4
Elizabeth..... 15.1	Spring Lake..... 69.0
Rahway..... 20.7	Seagirt..... 70.7
Perth Amboy..... 28.2	Mansquan..... 71.7
South Amboy..... 32.3	Brielle..... 72.7
Keyport..... 38.3	Pt. Pleasant..... 74.3
Middletown..... 44.4	Burrsville..... 75.7
Red Bank..... 49.3	Lakewood..... 84.0
Shrewsbury..... 51.2	Toms River..... 84.0
Eatontown..... 52.8	Bayville..... 98.4
Long Branch..... 57.4	Barnegat..... 110.4
West End..... 59.0	Manahawken..... 115.2
Elberon..... 60.7	Tuckerton..... 122.9
Deal..... 62.1	New Gretna..... 129.6
Allenhurst..... 63.1	Port Republic..... 136.3
Asbury Park..... 64.3	Oceanville..... 140.7
Ocean Grove..... 65.2	Absecon..... 144.2
Bradley Beach..... 65.7	Atlantic City..... 153.5

Atlantic City-Cape May.

Miles	Miles
Atlantic City..... 0.0	Ocean View..... 26.8
Pleasantville..... 5.3	Cape May C. H..... 35.6
Ocean City..... 14.9	Rio Grande..... 41.5
Seaville..... 24.6	Cape May..... 48.1

Cape May-Philadelphia.

Miles	Miles
Cape May..... 0.0	Franklinville..... 62.4
Cape May C. H..... 13.1	Clayton..... 65.0
Deansville..... 22.0	Glassboro..... 67.7

Eldora..... 27.0	Hurffville..... 72.3
Leesburg..... 33.2	Westville..... 80.0
Mauricetown..... 37.3	Gloucester..... 80.9
Millville..... 46.8	Camden..... 85.5
Vineland..... 53.3	Philadelphia..... 85.5

LONG ISLAND'S BOULEVARDS

Two-Day Tour Through New York City's Great Suburb and Massive Playgrounds

MOTORISTS who have toured over the twisting, tortuous roads in mountainous country, or through the deep sands and gumbo of country

While in natural foliage the island is not to be compared to southern or other sections of the country, the work of the landscape artist is found in its highest form and has transformed large sections into beautiful parks and estates.

It is a great summer playground and has many watering resorts, with excellent accommodations for the tourist at convenient points. Short but interesting ferry trips are included in the run and the Connecticut shore may be reached by ferry from Sag Harbor, Shelter Island, Greenport and Port Jefferson. The accompanying itinerary, however, gives the places and mileages for a continuous trip from Long Island City, which is reached from New York via Queensborough bridge and return. Two

days' motoring will comfortably encircle the island, which is little more than 200 miles in circumference.

ITINERARY. AROUND LONG ISLAND.

Night Stops—Greenport, N. Y.—Two Days, 218.5 Miles.

New York City-Greenport.

Miles	Miles
L. Island City..... 0.0	Bayport..... 51.6
Jamaica..... 8.8	Blue Point..... 53.3
Springfield..... 11.7	Patchogue..... 55.1
Valley Stream..... 14.4	Bellport..... 59.4
Lynbrook..... 16.3	Moriches..... 67.2
Rockville Cent'r..... 17.6	East Port..... 72.8
Baldwin..... 19.5	West Hampton..... 79.2
Freeport..... 21.3	Quogue..... 82.3
Merrick..... 22.8	Good Ground..... 89.6
Amityville..... 30.0	Southampton..... 95.7
Babylon..... 35.5	Bridgehampton..... 102.0
Bay Shore..... 40.3	Sag Harbor..... 107.3
Islip..... 42.1	Shelter Island..... 112.8
Oakdale..... 47.0	Greenp't Ferry..... 115.0
Sayville..... 50.1	Greenport..... 115.1

Greenport-New York City.

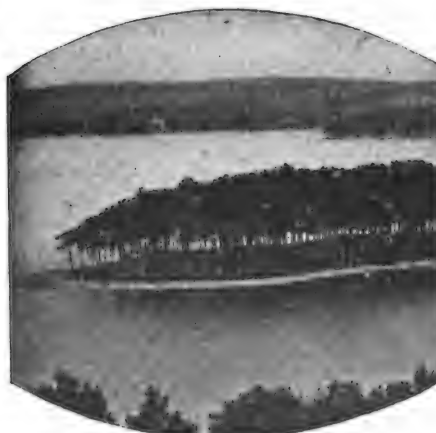
Miles	Miles
Greenport..... 0.0	St. James..... 54.0
Southold..... 4.7	Commack..... 62.3
Pecanic..... 8.0	Northport..... 68.2
Cutchogue..... 9.7	Centerport..... 69.4
Matituck..... 12.7	Huntington..... 72.6
Jamesport..... 16.7	E. Norwich..... 79.0
Riverhead..... 22.1	Roslyn..... 85.8
Wading River..... 33.1	Manhasset Hills..... 88.7
Miller's Place..... 41.7	Little Neck..... 91.4
Port Jefferson..... 46.4	Bayside..... 93.3
E. Setauket..... 48.2	Corona..... 98.7
Stony Brook..... 51.7	L. Island City..... 103.4



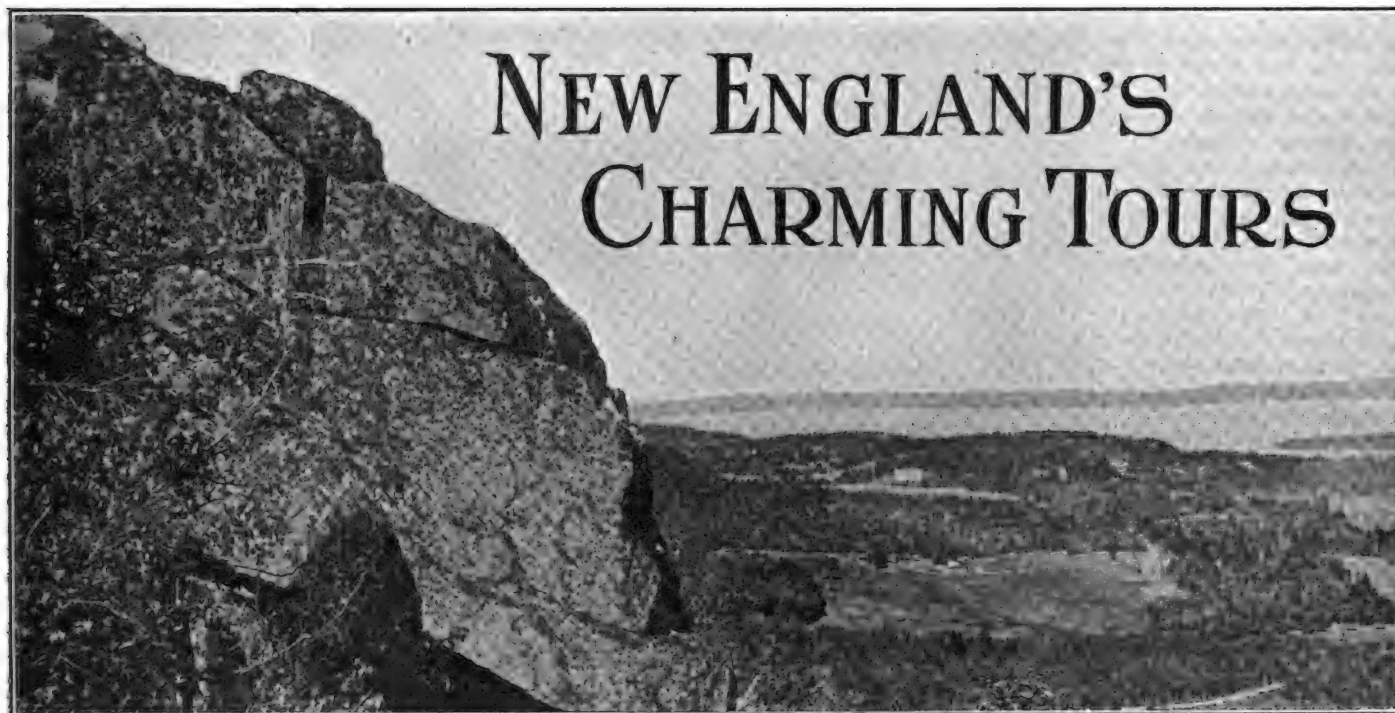
Montauk Light, Famous Atlantic Headland, at Eastern End of Island.

paths, will find in a tour around Long Island a veritable motorist's paradise. Not only do the magnificent boulevards that encircle the famous island afford the height of luxury in motor travel, but they traverse a country where luxurious residences and estates border the highways for miles.

The island, which is called New York's greatest suburb, is the home of more wealth for its size than any other section of the country. It is also famous as the home of many of America's greatest authors and artists, and its beautiful spots of interest and scenery have been reproduced on canvas for posterity.



Chestnut Point, Lake Hopatcong, N. J.



SIX STATES PACKED WITH INTEREST

THERE is probably more touring over the New England highways in a season than in all the rest of the country put together, although little effort has been made by highway organizations to interest the motorists in the magnificent roads that form a closely set network throughout the six states of Maine, New Hampshire, Massachusetts, Vermont, Connecticut and Rhode Island.

The residents of New England, possessing more than their per capita share of automobiles ever since the car became popular, naturally became interested in good roads and when these were established leading to the famous summer resorts and historic points of interest and great industrial centres, motorists from other sections were quick to spread the news across the country that the going "was good" in New England and that accommodations of the highest class were found convenient at all times.

Except to point out and explain the historic points of interest there is little to be said to the resident of New England about touring that section, but to any of the several million odd owners of automobiles who have yet to visit its hospitable environs, it should be said that in sounding the slogan of "See America First," they should see New England first of all, as it was the home of the most enterprising settlers that founded the country and men who were largely responsible for most of our

great institutions and vast industrial enterprises.

In the first itinerary, that designated as the "New England-Canada" tour, a comprehensive trip of about a month is routed around the outskirts of New England, through its principal cities, mountain regions and famous watering places.

With New York as the starting place, probably the main point of entry for the majority of tourists to New England, the route follows out the main road up the west bank of the Hudson river through Tarrytown, Poughkeepsie to Hudson, where a turn is made to the East into the Berkshire Hills to Pittsfield, Mass.

Northward, through Williamstown,

Manchester and Rutland, the road passes into the famous Green Mountain country and along the valley of Lake Champlain to Burlington, which is on the lake shore. Striking into the mountainous country the route leads to the northwest to Newport, Vt., which is located on the shores of the southern end of Lake Memphremagog, which extends northward into Canada.

Through the White Mountains.

Turning again to the south, the route leads into the White Mountains through St. Johnsbury to Bretton Woods, one of the leading mountain resorts in New England. Mt. Washington is seen in the distance and throughout the surrounding territory the rivers and streams are noted among fishermen as furnishing the finest of piscatorial sport.

Thousands of tourists visit this section every summer to enjoy the fishing, golf, mountain climbing and the cool breezes which never cease to fan the valleys and mountain passes.

On the fourth day out, the route turns to the north into the valley of the Connecticut river, thence to the Mohawk into Dixville Notch, another well known scenic point in New Hampshire.

The next swing of the tour leads into Maine, through Newry, Rumford, Dixfield to Rangle Lakes, which for many years has been a rendezvous for anglers. Heavily wooded sections are passed through which annually are visited



Kennebec Lake, in the Heart of the Maine Camping Region.

by large numbers of hunters, who find it one of the best game fields in the country for deer, moose and fur bearing animals.

Continuing its zig-zag course, the route shifts to the southward for a run of about 80 miles to Skowhegan and then northward again to Greenville Junction on the shores of Moosehead Lake, the largest body of fresh water entirely within New England boundaries. This station on the lake is one of the foremost gathering places for campers, hunters and anglers.

For the first time in a week the tourist again turns back toward a centre of industry, touring southward over fine gravel roads through Bangor to Bar Harbor, Bangor, which is located at the head of navigation on the Penobscot river, at the junction with the Kenduskeag. The trip from that point to Bar Harbor should prove one of the most delightful of the tour, as it passes through a country which is typical of Maine's beautiful scenery, the road winding through hills and past scenic lakes to Mt. Desert Island, which is reached over a toll bridge from Ellsworth.

On the island is the latest addition to the national park areas, the Sieur De Monts National Monument, which was accepted by the government in July of last year. It consists of 5000 acres, directly to the south of Bar Harbor and borders on the sea. Within this area there are four lakes and 10 mountains. The scene from the notable Sieur De Monts Crag is shown at the beginning of this article.

Around its northern borders are the homes and estates of thousands of wealthy people who spend their summers on the island.

On the way from Bar Harbor to Calais and St. John, N. B., the road is a good dirt highway through a picturesque country along the rugged shore line, which is typical of the rock bound coast for which the State of Maine is noted.

A good road leads out of St. John through the valley of the Petitcodiac river into Moncton. The tides rise and fall in this river many feet, a fact which has made it famous among mariners for many centuries.

On the remainder of the route through New Brunswick, leading to Chatham, at the head of Miramichi bay, off the Gulf of St. Law-



Picturesque Bolton Falls, on Little River, Vt.

rence and southward again to Fredericton, the country is wild and unless the weather has been pleasant it should not be attempted.

The Canadian boundary is crossed against, going to Houlton, Me., which is the metropolis of Aroostook county, the leading potato producing county in the world and which recently became the wealthiest per capita in the country as a result of the fabulous prices received for its products. Hundreds of its citizens last year made modest fortunes on their potato crops and boom times have prevailed in the county ever since.

ists are usually satisfied in going slowly and devoting a whole day to the run in order to see the many interesting places and give the necessary time for a thorough appreciation. Bath, which is famous as a shipping building centre, and the place where many of the old war frigates were constructed, is close by the site of the first settlement in New England, at the mouth of the Kennebec river, where a village was founded in 1607 by the English.

A Modern Boulevard.

A boulevard 26 miles in length connects Bath with Portland, the largest city in Maine.

The tour now leads inland to the southwest, running through Kennebunk, which was settled in 1602, and across the New Hampshire line to Dover, the capital of that state. Turning directly southward the route is through Manchester, a great cloth manufacturing town, Nashua, Wrentham and North Attleboro, Mass., to Pawtucket, R. I. The latter city is said to have the most diversified line of manufactures of any city in the country. Crossing the bridge into the centre of the city the first cotton mill ever built in the United States is passed. It still stands near the falls from which power was taken to operate the machinery.

In Providence, the beautiful city founded by Roger Williams, the tourist will



Ruins of Fort Ticonderoga, an Historic Shrine.

find many points of interest worth visiting before continuing on the route, which leads back to the sea coast again. On the hill where Roger Williams landed after being banished from Massachusetts, is Brown University, one of the oldest colleges in the country, and on the westward slope of the same hill is the First Baptist Church founded by the famous Baptist divine.

Out of Providence the route lies along the shores of Narragansett Bay to Fall River and New Bedford, thence around Cape Cod. Fall River and New Bedford, once famous whaling towns, are now the centres of some of the largest cotton goods manufacturing companies in the world. On the cape the principal industries are cranberry raising and fishing, although of late years it has become a popular summering place for people from all over the country. Returning from the cape via New Bedford a run is made through Tiverton to Newport, which is famous the world over as the social capital of America.

Besides the many palatial summer residences and beautiful estates, there are numerous places of present day and historic interest. The government maintains a training school for marines in the city, a war college, torpedo station and Fort Adams, which protects the entrance to Narragansett bay, is on the outskirts. In one of the parks the Old Stone Mill still stands. This peculiar shaped structure has worried the historians for many years in accounting for its origin. Some contend that it was built by the early settlers, while others are of the belief that it is the only remaining trace in this country of the early explorations of Eric the Red, while still others think it antedated that period.

Where the Pilgrims Landed.

Another historic place in our country's early history, Plymouth, Mass., is reached on the next day's run. Here the Mayflower landed its sturdy band of Pilgrims in 1620 and the rock on which the first Pilgrim set foot is still preserved beneath a beautiful canopy to commemorate the event.

In swinging back to New York the route runs directly across Massachusetts, through Worcester and Springfield, two manufacturing centres, and south across the western section of Connecticut through Hartford and Waterbury to Bridgeport. From the latter city, which is a thriving munitions city and boat building centre, the tour winds along Long Island Sound into New York.

There are many interesting features about these New England cities. Springfield is noted for its magnificent municipal buildings, a group in Court Square alone, costing \$2,000,000. An enormous clock tower, 300 feet high, stands in one



Lake View, Near Mt. Katahdin, Maine's Highest Peak.

of the squares and from its top one may look into the Connecticut valley. It has 12 bells, which chime the "Cambridge Quarters" of Handel.

Famous Arsenal at Springfield.

A U. S. Arsenal, where the famous Springfield rifles are made, is located in the city. During the Civil War 800,000 of these arms were turned out.

Hartford, the capital of Connecticut, is famous for its many well known insurance companies and the number of its sons that have found their way into the hall of fame. The constitution of the colony, which was settled in 1633 by Tom Hooker of Hartford, England, is said to have been the prototype of the Constitution of the United States.

The Colt Firearms plant, which made the name "Colt" a synonym for pistols the world over, is located in the city, and at present turns out the Colt automatic, which is standard equipment in the United States Army and Navy.

Relics at Hartford.

Hartford is a city of parks, having 17, with an area of 700 acres. In the State House there is a chair made from the famous Charter Oak in which the colony's charter was concealed. The famous Stuart portrait of Washington hangs in the capital.

Waterbury is a thriving industrial city where thousands of tons of brass are worked into finished products annually. One concern alone turns out over half a million watches annually, and another company has a like production. It is also a great button city and a big silverware corporation has its plant there.

The famous valleys of Connecticut are always pleasing sights in the summer touring season. Far away the traveler will descry a billowy expanse, puzzling one to know whether it is a circus or the sea out of place. It will turn out to be a great canvas covering over tobacco fields in the distance.

ITINERARY.

NEW ENGLAND-CANADA.

Night Stops—New York, Pittsfield, Mass.; Burlington, Vt.; Bretton Woods, Dixville, N. H.; Rangeley, Moosehead Lake, Bar Harbor, Me.; St. Stephens, St. John, Moncton, Fredricton, N. B.; Houlton, Bangor, Portland, Me.; Concord, N. H.; Providence, R. I.; Provincetown, Mass.; Newport, R. I.; Plymouth, Springfield, Mass.; New York City. Twenty-two Days, 2533.5 Miles.

New York-Pittsfield.

	Miles		Miles
New York	0.0	Rhinebeck	88.6
Yonkers	12.9	Red Hook	94.0
Hastings-On-Hudson	106.1	Livingston	106.1
Hudson	17.4	Hudson	114.4
Dobbs Ferry	18.4	Claverack	118.9
Tarrytown	23.4	Mellenville	123.0
Searbore	27.6	Ghent	129.2
Ossining	29.3	Chatham	131.4
Harmon	32.0	New Concord	134.4
Peekskill	40.8	East Chatham	137.5
Wappinger's Falls	64.9	Shaker Village, Queechey, N. Y.	143.1
Poughkeepsie	72.5	Mass.	150.6
Hyde Park	78.6	Pittsfield, Mass.	155.3

Pittsfield-Burlington.

	Miles		Miles
Pittsfield	0.0	Castleton	103.2



Cape Neddick Light and a Mariner's Mark, the Nubble, Along the Coast of Maine.

Lanesboro	5.2	Can'ton Corners	104.9
S. Williamstown	16.5	Hubbardton	112.0
Williamstown	21.5	Hyde Manor	117.7
Pownal, Vt.	25.9	Sudbury	119.0
Bennington	35.3	Whiting	123.6
S. Shaftsbury	40.6	Cornwall	130.5
Arlington	50.5	Middlebury	134.8
Manchester	58.5	Brookville	138.4
East Dorset	65.0	New Haven Junction	143.9
Danby	72.4	tion	147.7
Wallingford	81.8	Vergennes	147.7
Clarendon	85.2	Shelburne	163.5
Rutland	91.8	Burlington	170.4

Burlington-Bretton Woods.

Burlington	0.0	Westmore	97.0
Essex Center	9.6	West Burke	107.1
Underhill	16.0	Lyndon Center	115.4
Cambridge	26.2	St. Johnsbury	121.6
Jeffersonville	28.8	Centre	124.4
Johnson	37.7	St. Johnsbury	134.0
N. Hyde Park	43.2	Lower Watford	137.1
Eden	47.2	Waterford	142.5
Westfield	63.7	Littleton	147.4
Troy	65.7	Bethlehem	150.5
Newport	76.2	Bethlehem Jet	161.0
West Derby	77.4	Bretton Woods	161.0
W. Charleston	86.3		

Bretton Woods-Dixville.

Bretton Woods	0.0	Stratford Hol-	
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Abbott	21.2	North Ellsworth	92.4
Gulford	26.4	Ellsworth Falls	98.4
Dover	34.4	Ellsworth	100.1
W. Charleston	46.1	Mt. Desert Island	
East Corinth	51.1	(Bar Harbor)	109.0

Bar Harbor-St. Stephen.

Bar Harbor	0.0	Harrington	49.7
Ellsworth	8.9	Columbia Falls	54.6
Hancock	18.9	Jonesboro	62.8
W. Sullivan Ferry	20.0	Machias	70.5
Sullivan	21.9	East Machias	74.8
East Sullivan	24.6	Baring	109.4
Gouldsboro	31.5	Milltown	112.6
Steuben	36.4	Calais, Me.	114.2
Millbridge	42.0	St. Stephen, N. H.	114.9

Calais-St. Stephens-St. John.

Calais	0.0	Musquash	66.3
Oak Bay	6.7	Spruce Lake	75.8
St. Andrews	20.3	Fairville	80.8
St. George	39.6	St. John	83.7
Lepraux	57.6		

St. John-Moncton.

St. John	0.0	Pettitcodiac	71.2
One Mile House	1.5	River Glade	76.4
Rothsay	8.9	Salisbury	81.8
Hampton Station	22.4	Moncton	95.9
Sussex	45.2		

Bangor-Portland.

Bangor	0.0	West Warren	70.1
Hampden	6.0	Waldoboro	76.7
Winterport	13.0	Damariscotta	87.2
Frankfort	15.8	New Castle	87.5
Prospect	19.9	Wiscasset	96.2
Searsport	28.9	Mount Swag	100.5
Belfast	34.3	Woolwich	105.7
Northport	42.1	Bath	105.7
Lincolnton	47.2	Brunswick	114.8
Camden	52.8	Freeport	123.3
Rockport	54.7	Yarmouth	129.0
Rockland	60.9	Falmouth	134.4
Thomaston	65.0	Portland	140.8

Portland-Concord.

Portland	0.0	S. Berwick, Me.	44.4
Scarboro	5.7	Dover, N. H.	48.7
Saco	14.3	Barrington	58.5
Biddeford	15.2	E. Northwood	64.6
Kennebunk	24.4	Northwood	68.2
Wells	29.0	Epsom	75.6
North Berwick	35.0	Concord	86.4

Concord-Providence.

Concord	0.0	Sudbury	71.0
Pembroke	5.8	Saxonville	76.2
Suncook	7.3	S. Framingham	79.9
Manchester	18.0	Sherborn	83.9
Merrimack	26.7	Medfield	90.0
Thornton's Ferry	30.2	Walpole	94.4
Nashua, N. H.	36.1	Wrentham	101.3
Tyngsboro, Mass.	42.5	N. Attleboro	107.7
Chelmsford	49.0	Pawtucket, R. I.	115.7
North Acton	57.7	Providence	120.0

Providence-Provincetown.

Providence	0.0	Sandwich	65.2
Seekonk, Mass.	4.5	W. Barnstable	72.9
Luther's Corners	12.8	Barnstable	76.0
Swansea	14.9	Yarmouth Port	79.0
Fall River	19.5	Dennis	83.5
W'port Factory	26.4	E. Dennis	85.5
New Bedford	32.7	Brewster	90.1
Fairhaven	34.6	Orleans	95.5
Mattapoisett	39.7	Eastham	99.4
Marion	44.7	S. Wellfleet	104.0
Wareham	50.5	Wellfleet	108.3
Onset	54.3	Truro	113.0
Sagamore	63.2	Provincetown	122.9

Provincetown-Newport.

Provincetown	0.0	Falmouth	78.5
N. Truro	6.3	N. Falmouth	85.8
Wellfleet	14.5	Monument Beach	91.4
Eastham	23.5	Onset	97.4
Orleans	27.0	Wareham	101.4
Chatham	36.6	Marion	107.2
S. Harwich	41.8	Mattapoisett	112.2
West Dennis	48.9	Fair Haven	117.3
S. Yarmouth	49.7	New Bedford	119.2
Hyannis	54.8	W'port Factory	125.5
Centerville	58.9	Bliss Cor., R. I.	132.1
Osterville	62.0	Tiverton	136.2
Marston's Mills	64.3	Newport	148.4

Newport-Plymouth.

Newport	0.0	Middleboro	45.4
Fall River	18.5	Mid'boro Green	47.2
Somerset	24.4	Wareville	50.3
Taunton	34.3	N. Carver	52.1
Hart's Corners	36.2	Plymouth	60.1

Plymouth-Springfield.

Plymouth	0.0	Ashland	59.7
Kingston	4.5	Westboro	68.6
W. Duxbury	8.8	North Grafton	74.8
Hanover	13.7	Worcester	80.9
Whitman	21.4	Cherry Valley	85.1
Brockton	25.7	Spencer	91.9
Stoughton	31.9	E. Brookfield	95.8
Sharon	36.8	Brookfield	98.7
Walpole	42.0	Warren	104.9
Medfield	46.4	Palmer	116.5
Sherborn	52.5	N. Wilbraham	121.6
S. Framingham	56.5	Springfield	131.9

Springfield-New York City.

Springfield	0.0	Sandy Hook	77.2
Windsor Locks	13.5	Newtown	78.7
Windsor	19.1	Danbury	88.1
Hartford	25.6	Ridgefield, Conn.	97.4
Farmington	34.6	S. Salem, N. Y.	101.2
Plainville	39.2	Bedford	110.2
Southington	43.9	White Plains	126.1
Plantville	45.5	Hart's Corners	128.5
Waterbury	56.1	Bronxville	134.4
Middlebury	61.7	New York	149.9



In the Moose Country of Maine, Showing Mr. W. L. Hodgkins with His Trophy.

Twin Mountain	low	37.6
House	5.4 North Stratford	46.1
Whitefield	14.0 Colebrook	59.3
Coos Junction	23.9 Kidderville	66.0
Groveton, N. H.	32.6 Dixville Notch	69.7

Dixville Notch-Rangeley.

Dixville Notch	0.0	Rumford	59.1
Errol	11.8	Ridgelyville	61.0
Upton, Me.	21.4	Dixfield	65.4
Newry	42.5	Weld	77.5
Hanover	47.7	Webb	79.8
Rumford Point	49.4	Madrid	84.6
Rumford Center	53.7	Rangeley, Me.	109.8

Rangeley-Moosehead Lake.

Rangeley	0.0	N. Cornville	88.4
Dead River Sta.	4.5	Athens	90.4
Stratton	19.8	Brighton	99.0
N. New Portland	56.9	Kingsbury	104.9
North Anson	65.2	Blanchard	117.7
Lakewood	72.0	Greenville	132.3
Skowhegan	77.7	Greenville Jet	133.7

Moosehead Lake-Bar Harbor.

Greenville Junction	0.0	Kenduskeag	59.1
tion	0.0	Bangor	73.1
Greenville	1.6	Brewer	73.8
Monson	15.1	E. Orrington	79.6

Moncton-Chatham.

Moncton	0.0	Rexton	48.0
Cocagne	22.3	Richibucto	50.6
Bucktonche	33.3	Chatham	88.0

Chatham-Fredrickton.

Chatham	0.0	Boiestown	65.0
Newcastle Ferry	4.6	Covered Bridge	83.0
Derby Jet	8.2	Nashwaak	92.5
Millerton	12.6	Marysville	101.8
Blackville	23.2	Fredrickton, N. B.	105.8
Doaktown	49.6		

Fredrickton-Houlton.

Fredrickton	0.0	Temple	56.9
Long	16.9	Woodstock, N. B.	63.9
Prince William	22.3	Richmond Cor.	70.6
Hawkshaw	37.7	Houlton, Me.	79.7

Houlton-Bangor.

Houlton	0.0	W. Enfield	79.5
Linneus	8.6	Passadumkeag	84.4
Haynesville	24.6	Olamou	89.9
Macwahoc	44.1	Costigan	97.8
Matamamkeag	53.8	Old Town	103.5
Lincoln	67.6	Orono	108.4
S. Lincoln	72.0	Bangor	116.3

CANADA



CIRCLING THROUGH NEW ENGLAND STATES

Eleven Days Trip From New York to Cool Mountain Retreats and Return Through Famous, Busy Industrial Cities

ANOTHER tour which is designated on the route map as the "New England Tour," follows out the general direction of the New England-

landscape gardening worked out in golf courses and gardens.

Similar country is encountered on the route to Williamstown, the site of Will-

the road passing through the Peru mountain pass and many delightful villages on to Sunapee Lake, N. H., 1104 feet above the sea.

Making the run into the White Mountains via Plymouth on the Pemigewasset river, the tourist strikes into the hills and mountains, their sides wooded with beautiful trees and shrubbery. Mt. Prospect, Mt. Welch and the Sandwich Mountains are visible from the road, also Livermore Falls and the Franconia Mountains, when Durgin's Hill is reached.

It is doubtful if a more beautiful stretch of roadside scenery exists than that witnessed passing through the Franconia Notch, which is five miles long and less than half a mile wide, laying in the western fringe of the Franconia Mountains. Along the heights above Ammonoosuc river to Bretton Woods, the famous Twin Mountains are passed.

Many Camping Sites.

Throughout this section the tourist will find ideal camping spots and magnificent mountain hotels and inns. Accommodations and facilities for enjoying all the forms of outdoor recreation and nature are at hand.

Crawford Notch, Glen Station and Intervale are the next scenic places reached in the order named. At Glen Station, which is near the Peabody river, the presidential peaks are in full view. On the road over Tug of War Hill, where the route enters the valley of the Saco river, is the Willey house, which was buried with its inmates by an avalanche in 1826.

Passing through the beautiful "Intervales" of the great ravine and on into Fryeburg and Bridgeton, a rolling coun-



Lake Sunapee, N. H., One of the Choice Scenic Environments on the New England Tours—Having Delightful Views.

Canada trip, intersects it at a number of points, but passes through the more densely settled sections of the territory and touches the principal cities.

From the same starting point the route leads out of New York over the Old Boston Post Road, through the suburbs of the metropolis, where are found many old inns that have been doing business for a century or more. The remainder of the stretch along the sound to Bridgeport teems with places and points of historic interest.

In Greenwich, the first town in Connecticut, the highway passes the former home of General Putnam and further on at Darien is the scene of the capture of the Rev. Moses Mather and his congregation by the British in 1781. The little brick church over which he presided still stands by the roadside.

Traversing Rich Valley.

At Stratford the route turns northward into the Housatonic valley, leading into the Berkshires and passing through the manufacturing towns of Ansonia, Waterbury and Thomaston, where thousands of watches and clocks are manufactured annually. Just before entering Canaan, where the Housatonic is reached, the route passes Haystack mountain, and at Ashley Falls and Sheffield the marble quarries are passed.

Great Barrington and Lenox, the latter in the heart of the beautiful Berkshire hills, are both well known summering places and contain some of the finest estates in New England. In addition to the natural beauty of the surrounding country, there are many examples of

lams College, and near the city the road passes within view of Graylock Mountain, the highest peak in Massachusetts. Mountainous scenery of the most rugged type abounds throughout this section and the route passes over routes that were formerly mountain trails.

Fine Summering City.

Manchester, Vt., contains one of the finest golf links in the country, where championship matches are played each summer. It has been a popular summering place for many years. The Connecticut river is crossed on the fourth day,



Prospect Lake, in the Far-Famed Berkshire Hills, Presents Many Expansive Views, As Its Name Implies.



Across Upland and Meadow in the Hills of New Hampshire, Mt. Washington
Rears its Rugged Head.

try dotted with farms and lakes is encountered, and the topography continues of this character until Poland Springs is reached.

Entertainment in Variety.

Poland Springs is famous the world over for its mineral springs and a large hotel is located there, affording all the conveniences to be obtained in the large cities. The water that comes from the springs is reputed to have great curative powers and is exported to all parts of the world.

A few miles beyond the springs is Sabbath Day Lake, where there is a large colony of Shakers. From this point the route runs to the sea coast at Portland.

A bituminous concrete highway, running along the coast connects Portland with Portsmouth, and passes through many towns which are noted as the homes of famous authors. Kennebunkport and York are the summer homes of William Dean Howells, John Kendrick Bangs, Thomas Nelson Page, Peter Finley Dunne, Booth Tarkington and George Barr McCutcheon.

Amongst Seaside Resorts.

Old Orchard, one of the most noted sea side resorts in the country, is reached by a short detour off the main highway. The bathing beach at Old Orchard is 400 feet wide and stretches out evenly for a distance of 10 miles.

Portsmouth is the home of a number of well known writers and artists, including Thomas Bailey Aldrich. The Portsmouth Navy Yard is located at Kittery, where the Russian and Japanese envoys met to settle the war in which they were engaged a number of years ago. The "Ranger," the famous privateer commanded by John Paul Jones, was built at Portsmouth.

Continuing southward along the coast line the highway goes through Newcastle, Newburyport, Salem, Lynn, Swampscott to Boston. Newburyport and Salem are old maritime cities, the latter being

the oldest city of the commonwealth and was at one time the centre of the East India trade and the home of a group of great shipping masters. The house occupied by Roger Williams before he was banished still stands in the town. It was the scene of several of the witchcraft trials and a short ways outside the town is Gallows Hill, where 19 people were hanged because they were found guilty of witchcraft.

Many Cities of Industry.

Lynn, which was founded in 1629, is a great manufacturing centre, where electrical goods and shoes are produced. The shoe business was started in the city in 1750.

Boston, the largest city in New England, has many historic buildings and places, including Bunker Hill monument,

Faneuil Hall, Old South Meeting House, King's Chapel, Paul Revere's House and other points which were associated with the Revolutionary War period. Harvard University is in Cambridge, across the Charles river.

From Boston the route runs south to Providence, through Wrentham, North Attleboro and Pawtucket, and continues along the west shore of Narragansett Bay to Narragansett Pier, one of the famous summer resorts on the southern coast of New England. During the summer time thousands of people bathe in the surf daily.

On the road leading down to Westerly, which skirts the shore, is the birthplace of Oliver Hazard Perry, who won a brilliant victory in the war of 1812 at Put-In-Bay, O., on Lake Erie.

At several of the Connecticut cities, including Bridgeport, it is possible to ferry over to Long Island and make the remainder of the trip over one of the island routes given on the same map with this tour.

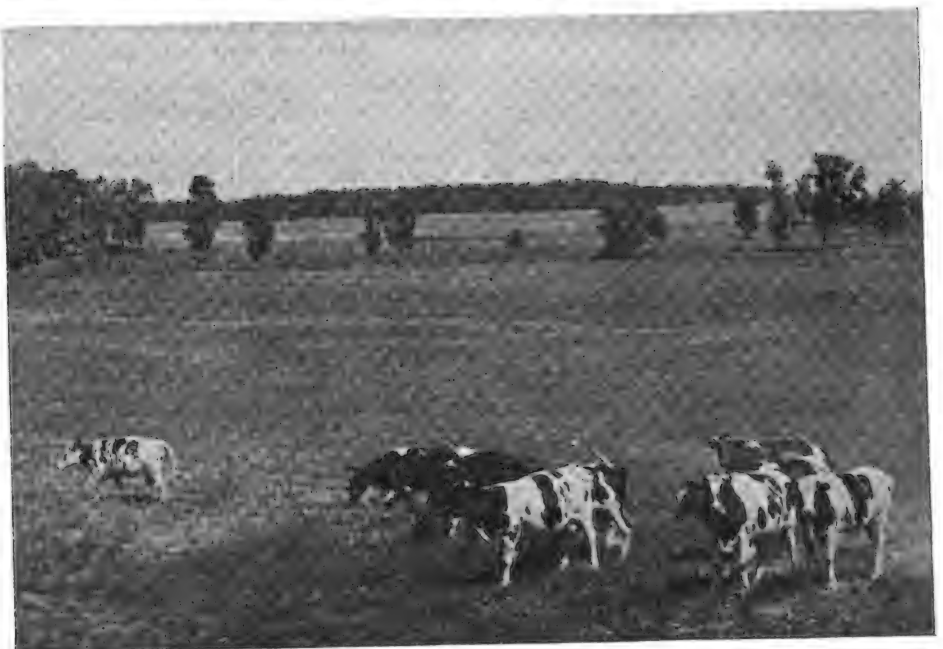
ITINERARY.

NEW ENGLAND TOUR.

Night Stops—New York, Waterbury, Conn.; Lenox, Mass.; Manchester, Vt.; Sunapee Lake, Profile House, Bretton Woods, N. H.; Poland Springs, Me.; Newcastle, N. H.; Boston, Mass.; New London, Conn.; New York City. Eleven Days, 899.9 Miles.

New York-Waterbury.

	Miles		Miles
New York.....	0.0	Westport.....	48.7
New Rochelle... 17.7		Southport.....	51.0
Mamaroneck... 21.1		Bridgeport.....	57.2
Rye..... 24.8		Stratford.....	60.9
Port Chester... 26.5		Shelton.....	70.7
Greenwich..... 29.6		Derby.....	71.0
Stamford..... 34.7		Seymour.....	78.6
Darien..... 39.2		Naugatuck.....	83.9
Norwalk..... 43.4		Waterbury.....	89.0



Pasture Scene on a New England Dairy Farm, Where Great Pride is Taken in High Grade Stock.



Naugatuck Valley, Conn., Wonderful for its Charming Landscape Views and the Many Fertile Farms on Every Hand.

Waterbury-Lenox.

Miles	Miles
Waterbury 0.0	Canaan 43.1
Waterville 2.8	Ashley Falls... 45.3
Thomaston 9.8	Sheffield 49.4
East Litchfield 17.0	G't Barrington 55.6
Torrington 20.0	Stockbridge ... 63.1
Norfolk 35.4	Lenox 69.1

Bretton Woods-Poland Springs.

Miles	Miles
Bretton Woods 0.0	East Fryeburg. 47.5
Bartlett 18.6	Bridgeton 56.7
Glen Station.. 24.7	Naples 65.8
Intervale 28.8	Cooks Mills... 68.8
Redstone 33.8	Webbs Mills... 73.3
Center Conway 36.5	Poland 81.4

Allen's Corners 24.0	York Beach... 68.2
Portland 27.7	York Harbor... 71.0
Scarboro 33.4	Kittery 79.2
Saco 42.0	Portsmouth ... 81.2
Biddeford 42.9	Newcastle 84.8

Newcastle-Boston.

Miles	Miles
Newcastle 0.0	Manchester-by-the-Sea 56.4
Eaton's Corners 19.7	Beverly Farms 59.1
Salisbury 23.6	Beverly 63.7
Newburyport.. 26.2	Salem 65.2
Newburyport Old Town... 29.9	Swampscott ... 71.0
Rowley 34.1	Lynn 72.9
Essex 43.2	Somerville 85.2
W. Gloucester. 46.8	Boston 89.1

Boston-New London.

Miles	Miles
Boston 0.0	E. Greenwich.. 54.0
Dedham 10.8	Hamilton 65.1
Norwood 15.0	Narragansett
Walpole 19.1	Pier 75.0
Wrentham 26.0	Westerly 99.1
Plainville 30.8	Mystic 108.3
N. Attleboro... 32.4	Noanck 110.9
Pawtucket 40.4	Groton 117.1
Providence 48.7	New London... 117.2
Apponaug 53.4	

New London-New York.

Miles	Miles
New London... 0.0	Milford 63.3
Flanders 6.3	Bridgeport 76.7
Lyme 15.9	Fairfield 81.2
Old Saybrook.. 26.4	Westport 82.8
Clinton 28.4	Norwalk 86.1



Near the Massachusetts State Line Rising Grades Bring the Tourists from the Berkshires Into the Scenic Delights of Vermont and New Hampshire.

Lenox-Manchester.

Miles	Miles
Lenox 0.0	Pownal 35.8
Pittsfield 6.6	Bennington Cen. 42.1
Lanesboro 11.9	S. Shaftsbury. 47.3
S. Williamstown 23.3	Shaftsbury Cen. 50.8
Williamstown.. 28.7	Arlington 57.0
Pownal Centre 33.3	Manchester ... 65.2

Manchester-Sunapee Lake.

Miles	Miles
Manchester ... 0.0	Springfield ... 38.9
Peru 11.5	N. Charlestown 48.0
Londonderry ... 16.5	Newport 63.2
Simonville 23.9	Guild 65.8
Chester 30.0	Sunapee 69.3

Lake Sunapee-Profile House.

Miles	Miles
Lake Sunapee. 0.0	Bridgewater .. 36.5
Georges Mills. 2.9	East Hebron... 41.4
New London... 7.9	Plymouth 50.2
Elkins 10.9	West Campton 57.3
Wilmot Flat.. 13.2	West Thornton 63.8
West Andover. 16.3	Woodstock 67.2
Danbury 22.4	Profile House.. 81.2

Profile House-Bretton Woods-Crawfords' Gap.

Miles	Miles
Profile House. 0.0	Mount Wash- 19.4
Twin Mountain House 13.4	ington 19.4
Bretton Woods 18.8	Crawford Gap. 21.8

Fryeburg 41.1 Poland Springs 84.7

Poland Springs-Newcastle.

Miles	Miles
Poland Springs 6.0	Kennebunk ... 52.1
Dry Mills 8.2	Wells 56.7
Gray 10.9	Ogunquit 62.2
West Falmouth 20.8	Cape Neddick.. 65.5

Madison 33.3	Darien 90.3
Guilford 38.5	Stamford 94.8
Branford 47.5	Greenwich 99.9
East Haven... 50.8	Portchester ... 103.0
New Haven... 54.9	Rye 104.7
West Haven... 58.5	Larchmont 110.0
Savin Rock... 59.6	New Rochelle.. 111.8
Woodmont 63.6	New York..... 128.5



St. Albans Bay, on Lake Champlain, Beautiful and Whispering of Romantic Early Naval Fights on This Fresh Water Sea.

AMID CENTRAL NEW ENGLAND SCENES

A Trip Through the Green and White Mountains Which Can Be Easily Covered by Motor Tourists Within a Week

A DELIGHTFUL trip, "through the Green and White Mountains," in Central New England, as the tour is called, can be conveniently covered

Ascutneyville the river is crossed again into Vermont and the route continues along the west bank of the river to White River Junction, where the night stop is

White river, which joins the Connecticut at White River Junction, the route inclines westward to Bethel, where it turns north again into the Green Mountains and toward Montpelier, the capital of the state.

Through St. Johnsbury and Littleton, the first views of the Franconia and White Mountains are obtained. It is only a short run from Littleton into Bretton Woods, where there are excellent accommodations for motorists. Mt. Washington, the highest peak in New England, is close by. The view from the top on a clear day extends into five states and into Canada.

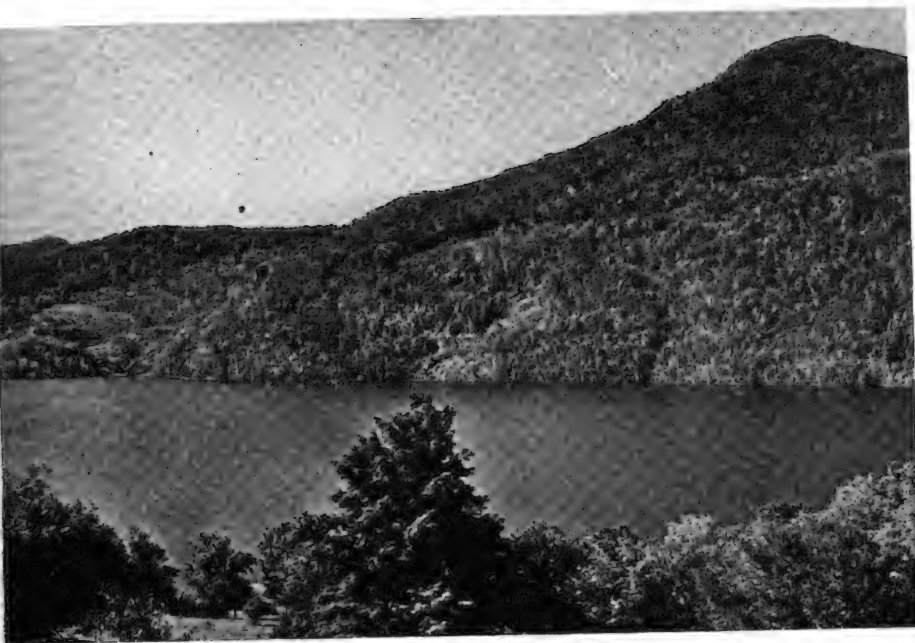
On the return trip the route is followed back to the Twin Mountain House, thence southward through the mountains to North Woodstock and Plymouth. The day's run ends at Concord. The final day's trip leads through Manchester, Nashua and Lowell into Boston.

ITINERARY. CENTRAL NEW ENGLAND.

Night Stops—White River Junction, Vt.; White Mountains, Concord, N. H.; Boston, Mass. Four Days, 440.5 Miles.

Springfield-White River Junction.

Miles		Miles	
Springfield.....	0.0	Bellows Falls..	79.4
Holyoke.....	8.7	S. Charlestown..	82.9
Northampton..	17.7	Charlestown....	86.7
South Deerfield	28.5	Claremont.....	97.5
Deerfield.....	33.7	W. Claremont..	100.2
Greenfield.....	36.9	Ascutneyville..	102.4
Bernardstown..	43.3	Windsor.....	107.7
Guilford.....	54.4	Hartland.....	112.4
Brattleboro...	57.2	N. Hartland...	117.0
Putney.....	66.4	White River	
Westminster...	74.4	Junction.....	122.6



Looking Across Lake Memphremagog in Vermont at a Freak of Nature Which is Popularly Termed "Owl's Head."

within a week, permitting ample time for stops and detours to points of interest off the main route.

Running, first north and then south, the route leads through a section of New England that is visited by thousands of people during the summer time. Starting from Springfield the route crosses the Connecticut river into West Springfield and follows the west bank of the river into Holyoke, which is one of the large centres in the paper making industry.

Mt. Tom and later Mt. Holyoke comes into view passing onto South Deerfield. In the latter place there is a monument on Bloody Brook battlefield, where the memorable battle was fought Sept. 18, 1675. Beyond Greenfield the river is crossed and the route leads into East Northfield. At Mt. Vernon there is a great dam across the river, which formed a large lake in front of the town of Brattleboro, which is the business centre for a large part of New Hampshire and Vermont.

Putney, Vt., is known throughout the industrial world for its slate, which is found in two great veins. This product has been taken out for roofing purposes and school slates for many years.

Beyond Bellows Falls the river is crossed again and the route lies along the east bank to Claremont, where Ascutney mountain comes into view. At

made. Windsor, which is on the road to the junction, was the scene of an impressive ceremony when the representatives of the Vermont towns gathered there and adopted the state constitution, July 2, 1777, following the news of the fall of Ft. Ticonderoga.

Following along the banks of the



A Worn Granite Surface Traversed by an Early Mountain Climb in the Sleur de Monts National Monument, Near Bar Harbor, Me.

White River Junction-White Mountains (Via Montpelier).

Miles	Miles
White River Junction..... 0.0	E. Montpelier..... 64.1
Hartford..... 1.6	Plainfield..... 68.2
W. Hartford..... 7.5	Marshfield..... 74.6
Sharon..... 13.5	Molly's Falls..... 76.4
Royalton..... 20.5	South Cabot..... 79.2
E. Bethel..... 25.8	Danville..... 87.9
S. Randolph..... 27.2	St. Johnsbury..... 95.2
	Lower W'ford..... 105.9

E. Randolph..... 30.8	Waterford..... 109.2
E. Brookfield..... 37.2	Littleton..... 114.7
Williamstown..... 44.8	Bethlehem..... 119.7
Barre..... 50.5	White Mount's..... 127.9
Montpelier..... 57.0	

White Mountains-Concord.

Miles	Miles
White Mount's..... 0.0	The Weirs..... 72.8
Woodstock..... 33.2	Lake Port..... 77.4
West Thornton..... 37.4	Laconia..... 79.1
West Campton..... 42.9	Tilton..... 88.4

Plymouth..... 50.4	Franklin Falls..... 91.4
Ashland..... 56.3	Franklin..... 92.2
Holderness..... 60.3	Penacook..... 104.4
Meredith..... 68.1	Concord..... 110.5

Concord-Boston.

Miles	Miles
Concord..... 0.0	Nashua..... 36.6
Pembroke..... 5.9	Lowell..... 51.2
Suncook..... 7.3	Burlington..... 62.9
Manchester..... 18.7	Cambridge..... 73.9
Merrimac..... 27.1	Boston..... 76.7

TRIP COVERING THE OLD MOHAWK TRAIL

Tour From Boston, Through the Heart of Connecticut and Striking Back the Side of the Triangle to Providence

IN SOUTHERN New England, comprising Massachusetts, Rhode Island and Connecticut, are many pretty places of more than passing interest aside from

Waldo Emerson, Nathaniel Hawthorne and Thoreau made their homes in the town and the houses in which they lived are still standing.

to Providence crosses through the heart of Connecticut, touching Manchester, Willimantic and Putnam. The route follows the Hockanum river from Hartford to Manchester, passing the picturesque Bolton Notch, and then descends into the valley of the Hop river.

In Rhode Island the route passes through the quaint old villages and over rolling roads into Providence, past the beautiful State House on Capital Hill, which was designed by Stanford White, and cost over \$8,000,000. From this point the tourist can also look down the hill on the mammoth plant of the Brown & Sharp Mfg. Co., where over 6000 mechanics are employed in turning out the company's widely known machine tools.

ITINERARY. MOHAWK TRAIL.

Night Stops—Boston, Mass.; Keene, N. H.; Williamstown, Mass.; Hartford, Conn., and Providence, R. I. Four Days, 349.7 Miles.

Boston-Keene.

Miles	Miles
Boston..... 0.0	Townsend..... 43.4
Cambridge..... 3.6	West Townsend..... 45.4
Arlington..... 6.9	Ashby..... 50.0
Lexington..... 11.9	West Rindge..... 62.9
North Acton..... 25.4	Jaffrey..... 68.0
Littleton C..... 28.3	Marlboro..... 82.9
Groton..... 35.2	Keene..... 87.5

Keene-Williamstown.

Miles	Miles
Keene..... 0.0	Greenfield..... 39.0
W. Swansey..... 5.4	Shelburne..... 44.2
Westport..... 7.8	Shelburne Falls..... 48.1
Winchester..... 13.1	Charlemont..... 56.8
Hinsdale..... 18.8	Whitcomb..... 68.1
E. Northfield..... 25.3	North Adams..... 75.4
N'field Village..... 26.3	Williamstown..... 80.8

Williamstown-Hartford.

Miles	Miles
Williamstown..... 0.0	Ashley F., Mass..... 52.3
S. Williamstown..... 5.4	Canaan, Conn..... 54.5
Lanesboro..... 17.0	Norfolk..... 61.9
Pittsfield..... 22.3	Winstead..... 71.2
Lenox..... 28.9	New Hartford..... 78.0
Stockbridge..... 34.8	Canton..... 84.3
G. Barrington..... 42.2	Avon..... 88.0
Sheffield..... 48.3	Hartford..... 97.4

Hartford-Providence.

Miles	Miles
Hartford..... 0.0	Pomfret, Center..... 49.8
Manchester Cen..... 8.7	Pomfret..... 51.9
Bolton Notch..... 13.0	Putnam, Conn..... 55.3
Andover..... 18.7	Chepachet..... 63.6
Willimantic..... 28.0	Harmony..... 73.2
Phoenixville..... 42.5	Providence..... 84.0



Concrete Arch Bridge Thrown Over the Deerfield River by Progressive Road Builders of the Commonwealth.

the numerous historical points for which the section is famous. A tour through this territory, including a trip over a section of the old Mohawk Trail, is especially attractive on account of the excellent highways that are encountered throughout the entire distance, most of them in fact being of the most modern type of construction and recently built.

The first leg of the tour, leading out of Boston, is particularly interesting, as it passes through places rich in historical interest in connection with events in the Revolutionary War. Out Commonwealth avenue to Cambridge the Harvard yard is passed and the Washington Elm, under which Washington took command of the Continental Army, and beyond Arlington is Lexington, where the first battle of the war for independence was fought.

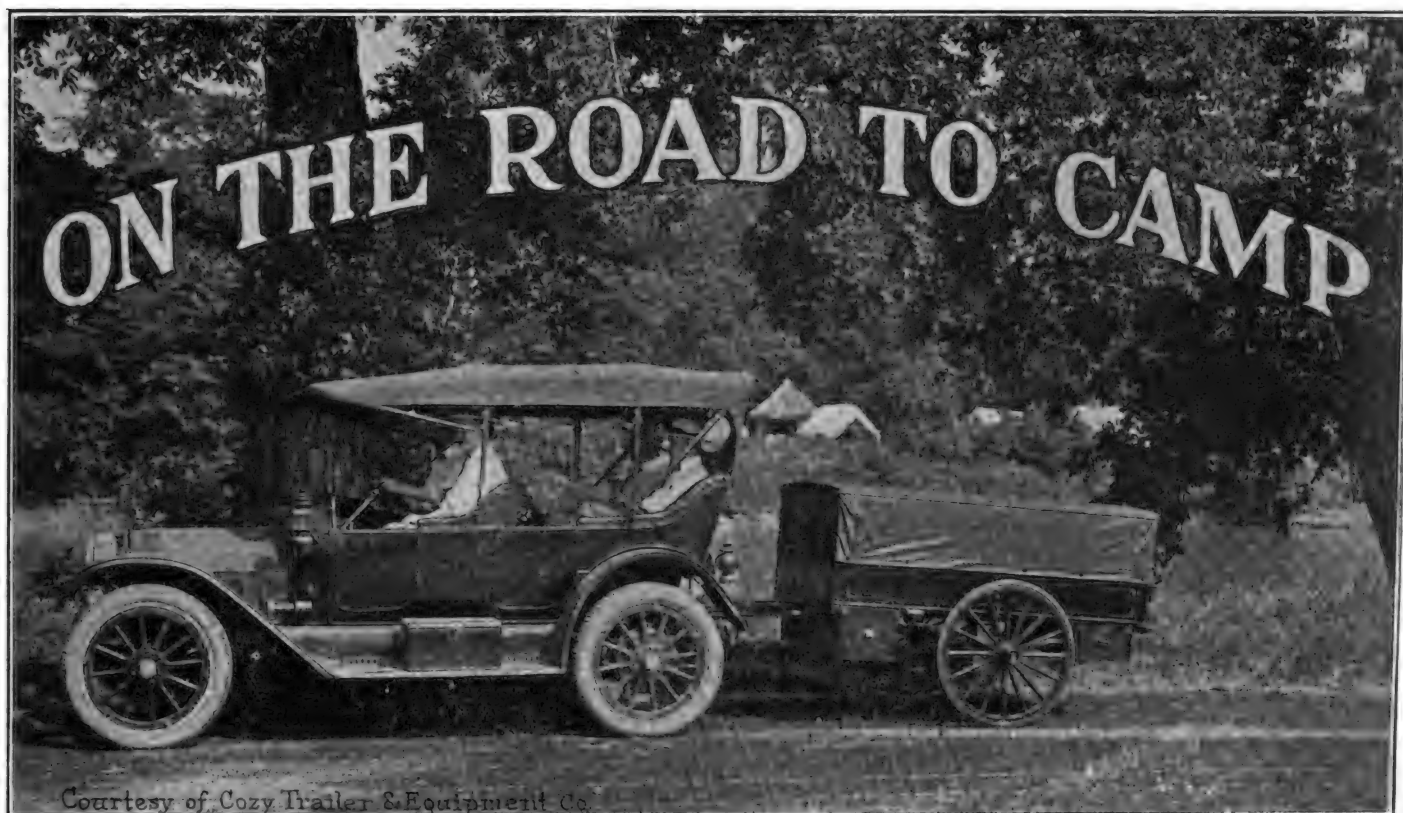
Many towns and villages passed through that have been in existence since colonial times are more or less linked with the history of the country. Concord, which is probably best known as the home of the luscious grapes of that name, is also famous as the home of eminent authors past and present. The Grapevine cottage, where is the arbor on which Concord grapes were first grown, stands by the highway. Ralph

Beyond Groton, the next place of importance is Keene, N. H. From this point the route leads southward along the Ashuelot river to Hinsdale, where it follows the east bank of the Connecticut river into Greenfield, Mass. The Mohawk Trail begins at Greenfield and leads over to the Hudson river. It is said that the Indians marked the trail in King Philip's time and used it in going from the Connecticut river to the Hudson. The route of the tour passes over the trail as far as Williamstown, Mass., long winding grades through Shelburne Falls and Charlemont, up the eastern slope of Hoosac mountain to Whitcomb Summit, make it one of the most beautiful stretches of road in the country.

Williamstown, situated on the Green and Hoosac rivers, is the seat of Williams College. It is one of the most beautiful little residential towns in New England.

The route south to Great Barrington, which lies through Pittsfield and Lenox, was described in the "New England-Canada" tour. From Great Barrington the tourist swings eastward through Winstead, Conn., into the Connecticut valley at Hartford.

The last leg of the tour from Hartford



A Complete Camp Outfit, Entirely Separated from the Automobile and Instantly Removable.

ALL who have ever gone upon a long tour will readily appreciate the fact that nearly all of the discomforts were the direct result of unpreparedness in the matter of equipment. Camping and touring outfits should be carefully planned ahead, and it frequently requires much foresight to provide for all emergencies. To the person who has become accustomed to all the conveniences of city life in the times when practically isolated from the source of supplies, emergencies arise, a tour becomes a trial.

Tourists may well be divided into two classes; those who go on the trip with the intention of depending upon hotels for their meals and sleeping quarters, and those who intend to be self-dependent. Of the two classes the second perhaps has the advantage over the first for the reason that, being prepared for every emergency, they are fully equipped for comfort under practically any conditions. If the trip has been well planned and the equipment adequate, it may be looked upon with feelings of

pleasure. The vow of "never again" is seldom heard from this class of pleasure seekers, but often from those of the first class.

After the route has been decided upon the first thing that should be done is to become familiar with laws relating to automobilists in the various states through which the trip is to be made. In addition to that found in the Automobile Journal digest of motor laws, information may be obtained by writing to either Secretary of State or Automobile Registration departments of the states in which the tour is planned, and is essential unless one cares to spend a day or so unwinding "legal red tape."

The next thing to be carefully looked after is the matter of car equipment and repair parts and upon this question much study should be spent in order not to overburden the car with unnecessary luggage. Tires are the first thing to be

considered. If all four tires are in good condition and if they are of a standard size, three extras will usually answer, one new one for both front and rear, together with a used or second "spare." If the front and rear are interchangeable, two extras are usually sufficient. At least nine inner tubes should be carried, five for the rear and four for the front. In addition to the regular tire tools, it is well to carry a vulcanizing outfit for repairing small blowouts or punctures. Twelve "gasoline" patches, a bottle of rubber cement and a flat strip of vulcanizing rubber of about one square foot in size, together with two blowout patches, completes the tire repair supply box. All of this material, including the tubes, should be carefully packed in a canvas or rubber bag to prevent deterioration.

It is not always possible to anticipate road conditions, many passable roads are rendered impassable by a prolonged downfall of rain, and, unless the motorist is fully equipped to cope with the dif-



The Tentobed Outfits May Be Compactly Packed for Transportation on the Running Board.



The Nesco Refrigerator.

facilities of "miring" he will probably be obliged to resort to the friendly aid of the automobile's predecessor, the humble horse. A set of mud hooks, chains, a length of tow line and possibly a block or pulling device is advisable.

So much for equipment; now to the question of repair parts for the car: One spare wheel for the front, and, if space permits, one for the rear; though in most of the cars the front wheel may be adapted to the rear in cases of emergency; an extra connecting rod with bearing, piston and one set of rings; six extra spark plugs and one set of manifold gaskets; sufficient brake lining for recovering all brake bands. The breakage of springs, axles, gears, etc., cannot be anticipated, and it is unnecessary to carry these supply parts along for the reason if care is exercised breakage in this line is reduced to a minimum, and supply parts of this sort may be obtained at practically any large town. There are enough necessary articles to be carried without encumbering the machine with such possible repair parts.

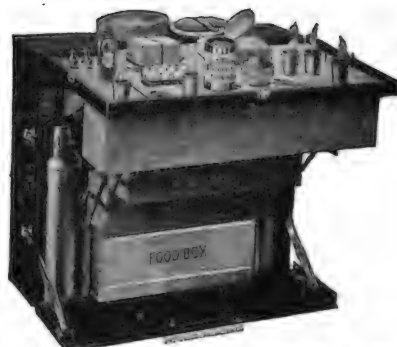
The tourist should make a point of having the gasoline tank kept full, stopping at every town in localities with which he is unfamiliar, as the next supply may be many miles away. In the tool box should be kept one-half gallon of lubricating oil, together with one pound of grease.

It has been assumed, of course, that the regular complement of tools, repair tape, etc., is to be carried. It is well to go over the tool box before starting and see that all necessary tools are in it.

Being held up upon the road for repairs and forced to go hungry is a state of affairs which is hardly acceptable to any motorist, yet it is a contingency which is apt to occur to even the "short tripper." To avoid such a necessity food carrying devices have been designed upon the idea of portables.

The Nesco Refrigerator, made by the National Enameling and Stamping Company of Milwaukee, Wis., is a convenient sized metal case with packed sides and rust proof lining with rounded corners and well finished. This chest measures 17¼ by 12 by 10½ inches, and is equipped with an enameled water cooler and ice receptacle.

The Globe Refrigerator Box, another chest of a similar nature, is made by the Globe Machine and Stamping Com-



A Knickerbocker Luncheon Case.

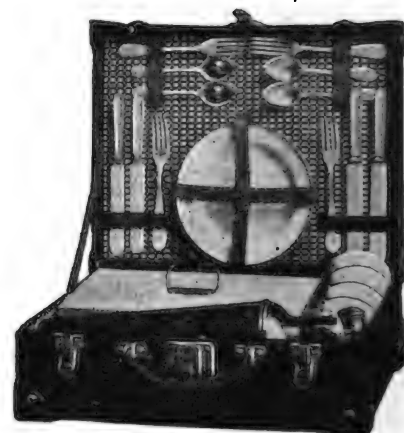


The Gordon Motor Crib.

pany of Cleveland, O. This refrigerator box is made of pressed steel with galvanized iron lining and has an insulation of asbestos. It is large enough to contain 25 pounds of ice, six bottles, food and a tray for silver.

The Motor Lunch Kits manufactured by Warren Leather Goods Company of Worcester, Mass., are compactly packed in suit case shaped boxes. The articles comprising the kits have been carefully selected for service and economy in space. The food boxes are made of agate ware and come in many sizes, according to the number of persons to be accommodated. Knives, forks, spoons, plates, sugar and salt containers, etc., are some of the articles contained therein.

The Knickerbocker—A luncheon case



Warren's Auto Lunch Kit.

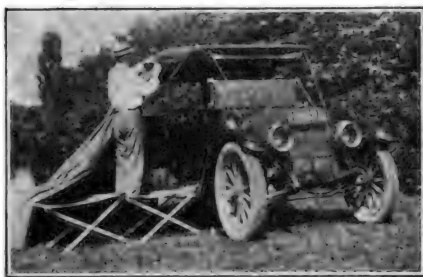
which is unique in that it answers the purpose of food and equipment carrier and table when extended is made by the Knickerbocker Case Company of Chicago, Ill. The illustration is more plainly understood than a description. This case may be had in a number of sizes and is very compact and easily carried.

The Berg Auto Trunk and Specialty Company, 15 East Fourth street, New York, make a luncheon case similar to the above. They also carry a complete line of luggage carriers, special trunks and cases of every description.

The Ferrostat Bottle—No food case is complete without one or more of the so-called "vacuum" bottles. A particularly adaptable bottle for the motor tourist is made by the Stanley Insulating Company of Great Barrington, Mass. This "Ferrostat" bottle is said to be practically indestructible, the feature being its all-metal construction. Between the inner and outer case is a compound of spongy texture which does not transmit heat to any great extent. After this compound has been put between the cases all of the air is exhausted by a pump, thus making a vacuum bottle. Being of all metal construction the welding of joints



Dinner Time at the Cozy Camp-Mobile Home on Wheels.



Attaching the Strong AutoTent is a Matter of Minutes.

is made possible, leaving no open interstices for the lodgement of dirt. The inner bottle is enameled and has the finish of glass. These bottles may be obtained in rubber, nickel or tan leather finish.

Eiseman, Kaiser & Co. of South Franklin street, Chicago, Ill., manufacture for personal equipment a line of adjustable toilet kits designed and filled with toilet articles for either men or women. These kits are equipped with straps and adjustable pockets for brushes, combs, mirrors, etc., and may be obtained in many sizes and designs.

When on a tour every inch of space in the car must be utilized and the baggage packed into the smallest possible bundle.

The Buffington Luggage Carrier, manufactured by C. A. Buffington & Co., Berkshire, N. Y., is designed to be attached to the back of the seat, and in it may be carried clothes, blankets, clothes brushes, etc. After articles have been placed in the pockets a lapel covers the top, making the container dust proof.

The Gordon Motor Crib, made by Gordon R. Watt & Co., 27 South Water street, Chicago, Ill., provides an outfit for "the smallest of the family." This crib is 32 by 14 inches in size and is attached to the robe rail or back of seat. It is provided with folding hood and spring connections so that jars and shocks are not transmitted to its occupant.

The problem of camp equipment has been solved for the motorist to a certain extent, as the manufacturers put up complete outfits either for extensive or short trip tours. Accessories in this line, which range from stoves to complete camps, are to be obtained at many places. The first consideration in the matter of camp equipment is that of space. Tents, stoves, beds, etc., must be so designed as to allow extremely compact packing. If one of the articles is adaptable for more than one use, then it is to be favorably considered.

The Schilling's Auto Camp Shelter Tent and Bed, measuring but five by eight by 51 inches, may conveniently be packed upon the running board. The sleeping portion of the bed inside the frame is 48 inches wide and 78 inches



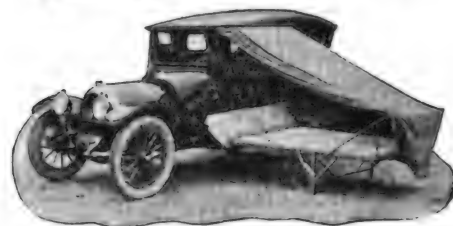
Moore's Collapsible Auto-Camp Grate Solves a Problem.

long. The frame, which is designed for attachment to the car running board, is constructed of pressed steel and enameled. The shelter top is of heavy U. S. Army Khaki, secured to the bed side rails, and top of the tonneau, making it possible to use the car as a dressing room. Adjustable side curtains permit total enclosure or open air sleeping, with top only for protection. This outfit is made by the L. F. Schilling Company, Salem, O.

The Strong Bungalow Company of Hartford, Conn., manufacture a wall tent for attachment to the automobile top of either two or three cot size. This tent is made of water proofed khaki and rolls into a very small bundle. This company markets a number of camp accessories, among which are telescope cots, which fold to 34 by 7 by 5 inches; air mattresses of water proof fabric, food boxes and many other articles of interest to the tourist.

Des Moines Tent—A tent which is designed as a shelter for the car, as well as the occupants, is sold by the Des Moines Tent and Awning Company of Des Moines, Iowa. This tent is made of sail drill and is guaranteed to be mildew proof and water repellant. It is light in weight and folds into a compact bundle.

J. H. Wittmann Manufacturing Company of Kansas City, Mo., manufacture a



Schilling's Auto-Camp Packed and Set Up.

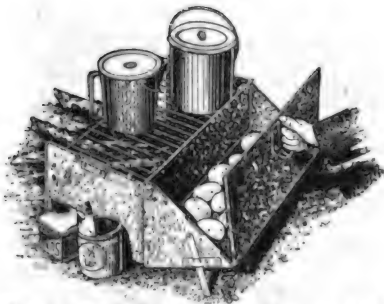
complete line of camping beds and tents of many sizes, styles and at various prices to fit the means of all classes. The tent and bed equipment is designed for attachment to the side of the car. It is stated that the complete housing and sleeping equipment weighs but 15 pounds per full grown passenger. The materials used are either balloon silk, which makes an exceptionally light equipment, or dry duck of a good grade. As an instance of the extremely compact outfit, the two-room tent with bed, packed in waterproof and dust proof bag, is but 54 by six inches in dimensions. In addition to tent and bed outfits this company markets a line of trailer cars with camp equipment.

For extensive touring it is often desirable, because of the number of tourists in the car, to carry along an extensive line of equipment. This necessitates the towing of one of the so-called "trailer" cars. Much of the time and worry of packing is eliminated when a trailer equipment is used and the extra weight of luggage is removed from the automobile itself.

The Auto-Kamp Equipment Company,



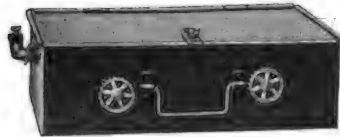
The Outfit Made by J. H. Wittmann Mfg. Co. Provides Sleeping Accommodations for Two Persons.



The Red-E Stove with Broiler and Oven Attached — Utilizing Any Length of Fire Wood.

Inc., of Saginaw, Mich., uses the words "a country home on wheels" in describing their trailer car camp outfit. This trailer car is designed to carry the full camping equipment without resorting to the necessity of overburdening the car with luggage. It is fitted with folding beds, water proof heavy khaki colored duck tent, folding tables, drawers for stowing small articles, and, in fact, is a full camp on wheels.

The Cozy Outfit—A trailer outfit is especially convenient for the reason that the trailer may be left at one point, and side trips taken with the automobile unencumbered with camping equipment. The Cozy Trailer Outfit, which is made by the Cozy Trailer and Equipment Co., 46-48 Kentucky Ave., Indianapolis, Ind., has a number of features both unique and ingenious. The canopy top is held up by a collapsible arrangement, occupying small packing space, yet roomy when set up. The outfit is equipped with ice box for carrying provisions, and a locker drawer for cooking utensils. The arrangement of these compartments is convenient in that they are always accessible and a noon day meal may be prepared without the necessity of disturbing the packing of the rest of the outfit or setting up camp. This outfit is easily unpacked and set up without the necessity of driving stakes or using guy ropes.



Moats Folding Gasoline Stove Number Two, Made by Prentiss-Waber Mfg. Co.

Regular wire spring beds are provided, collapsible table, two-burner gasoline stove and other equipment.

In fact, the outfit consists of all the essentials and no unessentials to encumber the camper or burden the machine.

The Hesse Camping Trailer is manufactured by the Wm. G. Hesse & Son Manufacturing Company of Leavenworth, Kan. This trailer is equipped with a water proof top, which may be opened so as to form two sleeping rooms, separated from the body of the trailer car which forms the kitchenette. The sleeping rooms are each provided with three windows with duck curtains, which are drawn up and down by cords on the inside. A heavy enamel duck cover conceals the entire top of the trailer when traveling, making it rain and dust proof.

As a general rule nearly all of the manufacturers of camp trailers either make or market a full line of camping material and accessories, which may be obtained either with the general equipment or separately at an additional cost. Individual requirements and preferences, however, sometimes require that special accessories be purchased.

A Folding Gasoline Stove is manufactured by the Prentiss-Waber Manufacturing Company of Grand Rapids, Wis. This stove has two six-inch grates and a tank of sufficient capacity to last 2½ hours. The full equipment, which consists of a coffee pot, two fry pans, one each of sugar and coffee retainers, pressure pump and funnel, may be closely packed and locked in the top of the stove box.



Globe Refrigerator Box Type A.

Red E Stoves—Where the supply of gasoline is limited and access is had to wood fuel, the Red E Stove with broiler and oven attached proves a happy combination. The grate is of steel with each bar welded to the frame. The stove portion takes any length of fire wood. When folded the stove is less than one inch thick and may be conveniently stored on the floor of the car. It is so arranged that all of the sooted or fire blackened portions fold inside. This stove is manufactured by the Red E Company of Durham, N. H.

The Collapsible Grate is a compact cooking device marketed by Leslie E. Moore of Long Beach, Cal., which weighs but 4½ pounds and may be folded into a space one by 1½ by 18 inches. The feature of this grate is that there are no separate parts to be lost. In addition to the grate may be had a folding top by which an inclosed stove is made.

The Gold Medal Camp Furniture Manufacturing Company of Racine, Wis., put out a very complete line of camp furniture, which is adaptable to the needs of the tourist. All of this equipment has been designed with the idea of compactness foremost. At the same time, however, strength has not been sacrificed. As an instance of this their five-foot folding bed is guaranteed to support over half a ton.



On the Road with All Baggage and Equipment Compactly Stowed in the Auto-Kamp Trailer.



In the Camp with All Equipment Complete and Readily Accessible at All Times.

ROAD DANGERS GUARDED BY HOOD

Tire Manufacturer Places Board with Conspicuous Warnings on Many New England Touring Routes



How a Wide Curve That May Be Taken at High Speed Is Protected by a Conspicuous Board in Loring Avenue, Salem, Mass.

MOTORISTS who reside in and who will tour New England will greatly benefit through the Hood Tire Co., Inc., manufacturer of Hood and Puritan pneumatic and Hood solid tires, which has already installed 80 large signs at different points on the principal routes, to impress upon them the necessity of caution to avoid danger.

These signs are a decidedly distinctive type, are sufficiently conspicuous to attract the attention of every driver by day and are so located they will be illuminated by the head lamps of every vehicle passing them toward the section of highway where there is need of special care.

The locations are generally at approaches to rough roads, railroad crossings, single or double curves and steep descents. First three cars and crews were sent over the routes to examine them, and more than 500 photographs were made and submitted to the company. With each photograph was a description of the highway and a suggestion for placing a sign that would sufficiently safeguard the drivers of cars.

From this series of photographs approximately 200 were selected as requiring warning signs, and the sizes were de-

termined as each particular condition appeared to justify. The accompanying illustrations will give a clear idea of the signs, all of which are 50 feet long and 10 feet high, having 500 square feet of



Warning of a Dangerous Curve at Cook Avenue and Main Street at Wilmington, Mass., Indicating the Direction of Danger.

space, with a representation of a chauffeur holding a red flag at the left end. At the right end is shown the circular seal or trade mark of the Hood company, which is 12 feet diameter.

Each sign is elevated and strongly

supported by braces, and below the main section is a lattice about 30 inches depth, which adds much to the appearance of the structure, and above is a small sign indicating the owner of the boards, which is a well known New York concern. The figure of the chauffeur, which is in outline, partly above the top of the main board, ranges from 15 to 32 feet height, and the height and consequent proportions of the figure is in keeping with the danger, for the purpose is to have directly before the eyes of the driver the towering form and the bright red flag.

For instance, at Norwood avenue, at the foot of Elmwood avenue, on the route from Providence to Narragansett Pier, R. I., where many fatalities have happened because of drivers not realizing their approach to a sharp right angle turn and a steep bank down which they were carried by their uncontrolled cars, the figure is 32 feet high and can be seen fully three miles by day and a quarter mile by night with ordinary head lamps.

The signs have yellow backgrounds with red borders and black lettering, and the seal, similar to what may be found suspended outside the place of business of every Hood tire dealer, is a white tire with blue centre and black letters.

The routes on which the signs are located, the number giving warning in

each direction, are as follows:

Route	No. Each Way	Total
New York, N. Y., to New Haven, Conn.	3	6
New Haven to New London, Conn. 2	4	4
Providence, R. I., to New London, Conn.	2	4
Providence, R. I., to Boston, Mass. 2	4	4
Boston to Concord, N. H.	2	4
Concord, N. H., to Bretton Woods, N. H.	2	4
Bretton Woods to White River Junction, Vt.	1	2
Wellington, Mass., to Greenfield, Mass.	2	4
Greenfield, Mass., to Springfield, Mass.	2	4
Pittsfield, Mass., to North Adams, Mass.	1	2
Pittsfield, Mass., to New York, N. Y.	4	8
Boston to Springfield, Mass.	4	8
Springfield to Pittsfield, Mass. 3	6	6
New Haven to Springfield, Mass. 2	4	4
Boston to Portland, Me.	2	4
Boston to Sagamore, Mass.	2	4
Boston to New Bedford, Mass. 1	2	2
Newport, Vt., to Burlington, Vt. 1	1	1
Total		75



Where There Is Need of Driving Cautiously on the Main Highway on the Route from Boston to Lowell, in Tewksbury, Mass.

NIAGARA AND THE GREAT LAKES COUNTRY

America's Premier Scenic Spot Attractive to Motorists Riding East Through Big Automobile Centers or Passing West

AMONG the many trips routed covering the states of Ohio and Michigan are several about the Great Lakes and in the Niagara Falls country,

presses vividly the fascination of the environment. In telling of his visit to Niagara, he wrote:

"It was not until I came to the table

thoughts of eternal rest and happiness—nothing of gloom or terror. Niagara was at once stamped on my heart, an image of beauty to remain there changeless and indelible until its pulses cease to beat forever * * * I think in every quiet season now, still do those waters roll and leap and rear and tumble all day long; still are the rainbows spanning them a hundred feet below. Still, when the sun is on them, do they shine and glow like molten gold. Still, when the day is gloomy, do they fall like snow, or seem to crumble away like the front of a great chalk cliff, or roll down the rock like dense white smoke. But always does the mighty stream seem to die as it comes down, and always from the unfathomable gulf rises that tremendous ghost of spray and mist which is ever laid, which has haunted this place with the same dread solemnity since darkness brooded on the deep, and that first flood before the deluge—light—came rushing on creation at the word of God."

Looking In the Whirlpool.

A sight of almost equal grandeur are the Whirlpool rapids, but a short distance down the river from the falls, formed by the narrowing of the gorge of the river to about 300 feet. The other well known points of interest in the section are too well known for description, although Niagara and its wonders are an old story one never tires of looking again and again upon its grandeur.

In the accompanying map a route is shown over the Niagara Falls Boulevard from Buffalo to the city of Niagara Falls, and also to Niagara on Lake Ontario, where the Niagara river enters the lake. Another pleasant trip of a day out along the shores of Lake Erie from Buffalo is mapped out in the other route shown.

Out of Buffalo on the route to Niagara Falls the route lies through Main street to Kenilworth avenue, which is followed out until the bridge crossing the Erie Canal is reached. From this point the Niagara Falls Boulevard starts and swings to the westward through Mar-



Niagara Falls and Goat Island from the American Side, and the Steamer "Maid of the Mist."

considered America's greatest scenic spot.

Niagara Falls, the centre of this marvelous territory, where nature has wrought many wonders, is one of the most far-famed sights in the world and thousands of people have come from all parts of the world to see this deluge of water in its precipitous drop into the gorge, where it forms a veritable maelstrom in its mad rush toward the sea.

Globe trotters and tourists have pronounced the section in the immediate vicinity of the falls the most interesting of any in the world, and it is said that one can see more fascinating wonders there in a day than can be seen elsewhere in a month of travel. It is a mecca for people on their wedding tours and is probably the most visited wonder in America.

The falls are situated at a point on the Niagara river about 26 miles from Buffalo on Lake Erie and 13 miles from Lake Ontario. Goat Island, which is located in the centre of the river at the crest, divides the falls. The Canadian or Horseshoe falls, on the Canadian side of the international boundary line, are 158 feet high and the American falls on the east side of the island are 167 feet high.

The Tribute of Dickens.

One might expatiate in volumes on this wonderful spot and then only inadequately convey an idea of the falls. A famous paragraph in Dickens' works, giving his impressions of the falls, ex-

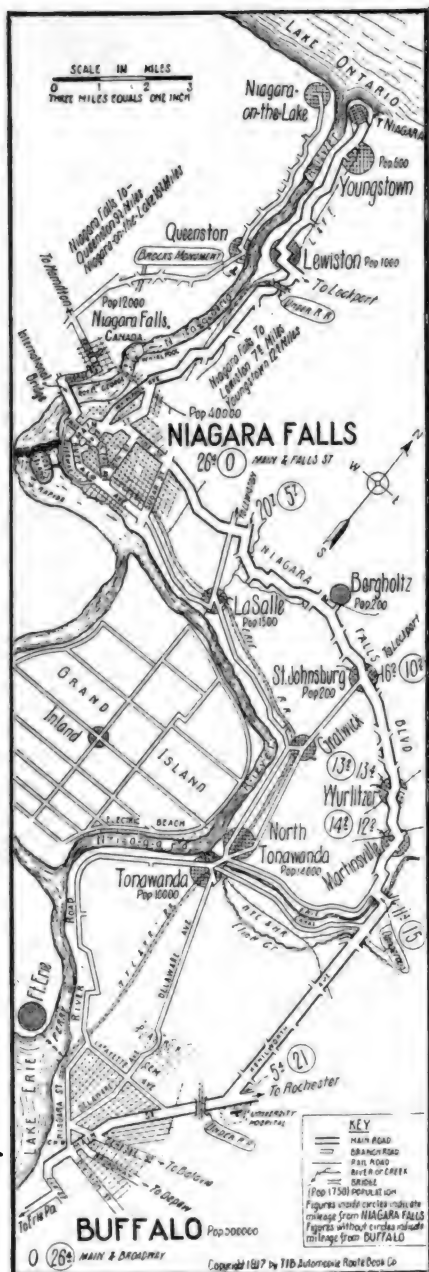
C. Harrison Minor, vice president and treasurer of the Touring Information Bureau, Kansas City, Mo., prepared the data for this article especially for this magazine from his own field notes obtained on these routes in a Tib Route Book Car. TIB has made special effort this year to produce touring information and strip maps of the highways in Michigan, Ohio, the best motor routes between Chicago and New York and along the lake shores to Niagara Falls. This will meet the conditions of increased East and West touring, incident to war conditions and the growth of the great automobile centres of Detroit and Cleveland.

This bureau welcomes inquiries at its office in Kansas City, Mo. The route car photographs and strip maps used in this article are copyrighted by TIB Automobile Route Book.

rock and looked—Great Heaven—on what a fall of bright green water!—that it came upon me in its full might and majesty. Then when I felt how near to my Creator I was standing, the first effect and the enduring one—instant and lasting—of the tremendous spectacle was peace. Peace of mind—tranquility—calm recollections of the dead; great



TIB Route Book Car Between Buffalo and Niagara Falls.



tinsville, Wurlitzer, Bergholtz, and into Pine street at Niagara Falls. The distance to this point is 26.4 miles. To Niagara, along the rapids, a distance of 13½ miles through Lewiston and Youngstown is a beautiful trip and passes along interesting country.

On Lake Erie Shores.

The other tour illustrated, that from Buffalo to Silver Creek, is 32.6 miles, and is one of the most popular drives with the citizens of the former city. The highway is of the most modern type, paved with brick for most of the distance and lies through rolling country in view of the lake. Just out of Buffalo on this route are mammoth smelters, at which is received and treated the ore shipped from Duluth to be prepared for the gigantic steel mills of Pennsylvania.

On the lake shores from Toledo, which is 311 miles from Buffalo to Cleveland, is now a well known motor highway. East out of Cleveland the motorist may take a direct route or a shore drive along Euclid Beach and Willough Beach to



Swanville, Penn., Showing Two Modes of Transportation and Two Types of Bridge Construction.

Willough, thence over an improved highway to Painesville. From Painesville to Ashtabula is over an improved gravel and concrete highway, with concrete predominating. Ashtabula is 56 miles from Cleveland.

From Ashtabula to Erie, continuing East a distance of 44 miles, bringing the total to 100 miles out of Cleveland, the tour is over macadam road, with several stretches of tarvia highway, some brick, through rolling country, which is hilly between Conneaut, near the Ohio-Pennsylvania line. At Conneaut is a toll bridge at which car and driver are assessed five cents and passengers one cent.

Erie holds many interesting points to the western tourist, among which are the beaches and big shipping and manufacturing industries. Here is one of the big plants of the General Electric Company.

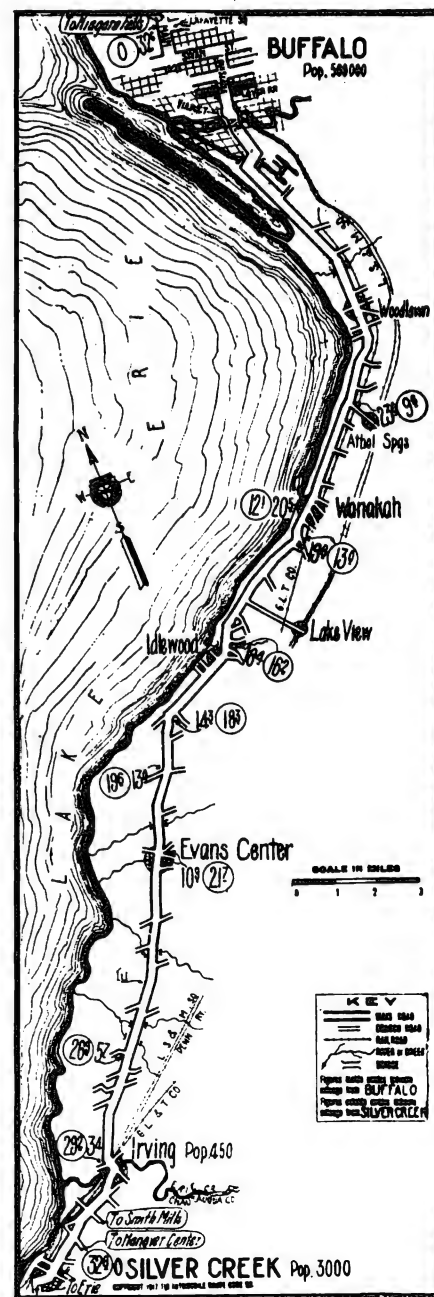
Through Grape Juice Country.

From Erie east to Silver Creek, 56 miles, is largely through a most scenic country with thousands of acres of grape arbors and with beautiful outlooking points, hills on one hand and the lake on the other. This is the "grape juice" district of the United States.

These trips are routed in the accompanying maps from the Tib Automobile Route Book of Ohio and Michigan, which is published by the Automobile Route Book Co., Kansas City, Mo. The manner of mapping the routes in the Tib books makes them very convenient for the motorist, as he can see at a glance from the book where the highway lies without consulting any text, road conditions and directions being graphically presented in concise form. The Tib Route Book National Edition covers the main traveled routes in America and is published in paper this year at \$2 a copy.

The new Ohio-Michigan Tib book was recently issued and covers all the main routes in those two states and deals with the newly improved 100 miles of highways around Detroit that have been paved by the State Highway Commission in the past few months. Concrete highways in Michigan have been greatly improved and the tourist will be able to penetrate the lake regions to a greater extent than ever before and can reach

any resorts over good roads that heretofore were out of the way.





DIRECT NORTHERN ROUTE TO NATIONAL PARKS

AT A time when a general sentiment of intense patriotism is abroad in the land a tour over the new Yellowstone Trail affords the motorist an exceptionally instructive trip as he passes from Plymouth, where the Mayflower landed with its sturdy band of settlers, across the country through the densely populated sections into the vast wheat fields of Minnesota and the Dakotas into the western mining country and territory where many of the scenic wonders of the world are found in several of our great national parks. These great reservations which have been set aside by the government to preserve their natural wonders and also as a place of refuge for animal life, include the Yellowstone, Glacier and Mt. Rainier national parks, the first named being the largest in the country.

The general impression among motorists who have never visited these great recreation grounds is that they are vast stretches of wilderness where touring or camping trips are only made by encountering great hardships and inconveniences. Last year nearly 500,000 tourists visited the national parks during the summer season, and it is anticipated that this year a much larger number will avail themselves of the excellent weather and stimulating environment that is found at this time of the year in these mountainous regions where the Department of the Interior has spent enormous amounts of money to turn them into ideal vacation grounds.

As will be seen from the master map, the local maps and itinerary, the Yellowstone Trail is one of the most convenient for New Englanders and residents of New York state and the lake states to



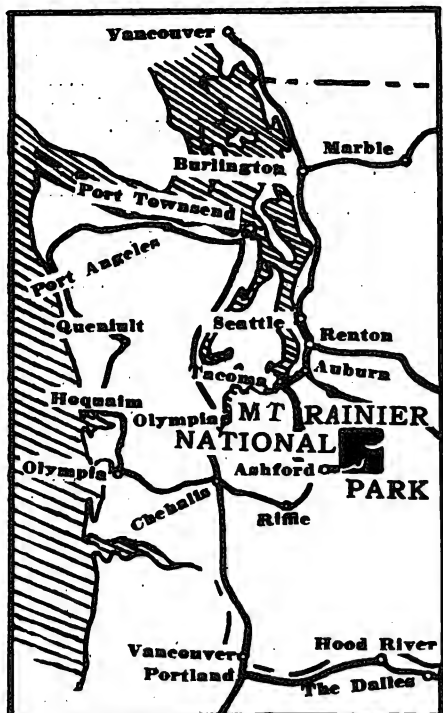
Old Faithful Geyser, Yellowstone National Park.

use in reaching the national parks in the northwest. Starting from Plymouth, Mass., on the shores of Cape Cod bay, the route passes through Providence, R. I.; Hartford, Conn., and through the cities of Poughkeepsie, Binghamton, Elmira and Olean in New York state in the order named. Crossing the northwestern corner of Pennsylvania, through the cities of Warren and Mercer, the trail leads into Youngstown, O.; Akron, O., and thence into Ft. Wayne, Ind. From the latter place it turns northward around the southern shores of Lake Michigan to Chicago, Ill. Continuing northward along the lake shore, through Kenosha and Racine, Wis., the route turns westward at Milwaukee. Oshkosh, Stevens Point and Eau Claire are passed through on the way to the Twin Cities, St. Paul and Minneapolis.

Crossing the Mississippi the route strikes out directly westward through the great wheat fields of western Minnesota, South Dakota, the southwest corner of North Dakota into Montana, where it joins at Terry the famous Yellowstone Trail from which it derived its name. This trail follows the winding course of the Yellowstone river through Billings, Livingston, Butte and Missoula, all in Montana.

Detour to National Park.

At Livingston, which is the nearest point along the trail to the Yellowstone National Park, a highway runs southward to Gardiner, the entrance to the park. After arriving at the park one is



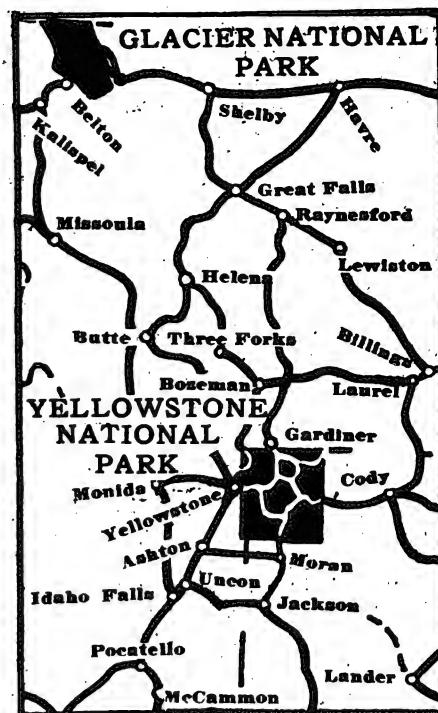
For Road Connections See Master Map on Page 16.

immediately impressed with the exceptionally fine accommodations afforded, as the Interior Department has made great effort to put the parks on a par with the best equipped summer resorts in the world. The excellent hotel system at the Yellowstone Park has this year been supplemented by a system of excellent new permanent camps, and in place of the historic stage coaches that were formerly used in carrying sight-seers in this wonderland, the government has substituted 10-passenger cars.

A whole book, devoted exclusively to a description of the Yellowstone Park would be entirely inadequate to more than touch upon the wonders it contains. In brief, the park is distinguished for its unexcelled scenic wonders and evidences of natural phenomena, including the many large geysers which are greater in size and number than are to be found elsewhere in the entire world. There are also many hot springs within its boundaries that enclose 3300 square miles, or more land than many of the small principalities abroad. The most famous of all these geysers is Old Faithful, which for many years has spouted every 70 minutes.

Motorists upon entering the park must pay \$7.50 in cash for an automobile permit, which is good for the entire season, expiring on Oct. 1 of the year of issue. There are a number of rules that must be observed by the motorists entering the park and a circular of information containing the general rules and regulations and a map will be issued to the owners when they obtain their permit at the ranger stations at the entrance.

Further along the Yellowstone Trail at Missoula, a route leads northward into Glacier National Park, which received its name because it forms a vast basin holding 60 odd glaciers amid a boundary of mountains. It covers an area of 1534 square miles, within which there is said to be more beautiful mountain scenery than can be found even in the European Alps. Precipices 3000 or 4000 feet deep form the background in many places for beautiful lakes formed from the water of the melting glaciers. There are 250 known lakes and probably many more in this park, as many sections still remain unexplored. The license fee for using motor vehicles in this park is \$1 and is also payable in cash at point of entry. It has not the big system of roadways excellent for automobile travel such as is found in Yellowstone Park, but



For Road Connections See Master Map on Page 16.

there are a few good roads for automobiles and trails for walking or horseback riding. There are hotels and camping places at both the eastern and western entrances, enabling the tourist to explore the park so far as possible on foot by making daily trips. More to the south Crater Lake National Park shares its unique natural wonders.

Starting back on the Yellowstone Trail at Missoula, the route crosses the Continental Divide, passing through Wallace and Couer D'Alene in Idaho, to Spokane. From this point the trail swings southward around the southwestern boundary line of the State of Washington, through Walla Walla and across the Columbia river to Prosser, thence turning northward through North Yakima, Cle Elum, Seattle and terminating at Tacoma, where there is a connecting road 56 miles long leading back to the Cascade mountains and into Mt. Rainier National Park.

From the entrance at Nisqually river there is a road about 20 miles long leading into Paradise valley. There is another road leading into the park at the northeast corner at White river. This road is about 12 miles long and



Eagle Crop and Phantom Ship, Showing Height of Rim, Crater Lake.

terminates at Glacier Basin, but there are no connections for motor travel with the route into Paradise Valley.

Mt. Rainier National Park, which has an area of 207,360 acres, received its name from Mt. Rainier, the second loftiest mountain in the United States, which rises in the centre of the great glacier basin in the middle of the park. This peak rises 14,408 feet and nearly 10,000 feet of this rise is direct from its immediate base. Twenty-eight glaciers surround the mountain, which is thought to have been 16,000 feet in height before a volcanic eruption tore off 2000 feet.

ITINERARY. YELLOWSTONE TRAIL.

Night Stops—Plymouth, Mass.; Hartford, Conn.; Poughkeepsie, N. Y.; Binghamton, Olean, Youngstown, O.; Fort Wayne, Ind.; Chicago, Ill.; Milwaukee, Wis.; Minneapolis, Minn.; Millbank, S. D.; Selby, Terry, Mont.; Custer, Livingston, Butte, Missoula, Spokane, Wash.; Walla Walla, Tacoma. Twenty Days, 3946.4 Miles.

Arkville	57.8	Ninevah	131.0
Delgi	83.3	Belden	136.9
Unadilla	109.9	Sanitary Sps.	142.6
Bainbridge	120.4	Binghamton	153.7

Binghamton-Elmira.

Binghamton	0.0	Waverly	45.0
Owego	24.3	Lowman	55.6
Smithboro	35.3	Elmira	63.6

Elmira-Salamanca.

Elmira	0.0	Almond	67.1
Corning	18.6	Alfred Sta.	70.8
Addison	30.3	Andover	79.8
Cameron	43.2	Bolivar	101.9
Canisteo	56.5	Salamanca	138.2
Hornell	61.8		

Salamanca, N. Y.-Youngstown, O.

Salamanca	0.0	Mercer	168.0
Warren	65.0	Youngstown	210.0
Franklin	128.0		

Youngstown-Akron, O.

Youngstown	0.0	Ravenna	32.6
Edinburg	25.9	Akron	50.0

Akron-Ft. Wayne, Ind.

Akron	0.0	Ottawa	147.8
Oberlin	46.7	Du Pont	162.8
Bellevue	83.0	Paulding	178.0

Selby-Hettinger.

Selby	0.0	McIntosh	110.5
Mobridge	35.0	Hettinger	197.5

Hettinger-Terry.

Hettinger	0.0	Baker	158.5
Bowman	72.0	Terry	200.5
Martin	115.5		

Terry-Custer.

Terry	0.0	Forsyth	90.9
Miles City	39.3	Custer	142.6

Custer-Livingston.

Custer	0.0	Reed Point	124.7
Billings	57.7	Livingston	185.5

Livingston-Butte.

Livingston	0.0	Whitehall	105.1
Boseman	26.7	Butte	139.3
Three Forks	61.5		

Butte-Drummond.

Butte	0.0	Garrison	63.8
Anaconda	25.8	Drummond	84.6
Deer Lodge	52.3		

Drummond-Wallace.

Drummond	0.0	Missoula	58.1
Bearmount	13.5	Wallace	181.5



Mt. Rainier, a Remarkable Peak, Which Rises Nearly 10,000 Feet of Its Altitude of 14,408 Direct from Its Immediate Base.

Plymouth-Providence.

Plymouth	0.0	E. Providence	42.8
Middleboro	14.7	Providence	43.8
Taunton	25.8		

Providence-Hartford.

Providence	0.0	Willimantic	56.0
Chepatchet	15.4	Andover	65.3
Pomfret	32.1	Hartford	84.0

Hartford-Danbury.

Hartford	0.0	N. Milford	38.9
Plainville	13.8	Brookfield	61.7
Bantam	38.2	Danbury	69.0

Danbury-Poughkeepsie, N. Y.

Danbury	0.0	Stormville	27.8
Mill Plain	3.9	Flahkill P.	34.1
Brewster, N. Y.	10.0	N. Hackensack	37.7
Carmel	14.5	Poughkeepsie	45.1

Poughkeepsie-Kingston, N. Y.

Poughkeepsie	0.0	Rhinecliff	18.5
Hyde Park	6.1	Rondout F.	18.6
Rhinebeck	16.2	Kingston	22.0

Kingston-Binghamton.

Kingston	0.0	Afton	126.3
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Fosteria

Ft. Wayne-Chicago.

Ft. Wayne	0.0	Valparaiso	119.2
Columbia City	20.5	East Chicago	146.2
Warsaw	42.9	Hammond	149.2
Plymouth	72.5	Chicago	170.2

Chicago-Milwaukee.

Chicago	0.0	Kenosha	62.3
Evanston	13.1	Racine	73.0
Highland Pk.	26.0	S. Milwaukee	87.0
Waukegan	46.5	Milwaukee	96.4

Milwaukee-Minneapolis.

Milwaukee	0.0	Stanley	229.0
Fond Du Lac	62.0	Eau Claire	259.5
Oshkosh	81.0	St. Paul	358.7
Stevens Pt.	140.3	Minneapolis	368.7

Minneapolis-Milbank.

Excelsior	17.1	Sacred Heart	122.9
Waconia	31.1	Granite Falls	131.9
Brownston	67.9	Ortonville	205.4
Hector	86.9	Milbank	219.9

Milbank-Selby.

Milbank	0.0	Ipawitch	127.0
Webster	45.0	Bowdle	157.0
Aberdeen	97.0	Selby	190.0

Wallace-Spokane.

Wallace	0.0	Coeur D'Alene	52.3
Kellogg	11.6	Spokane	84.0

Spokane-Walla Walla.

Spokane	0.0	Dayton	143.5
Colfax	80.2	Walla Walla	176.4
Pomeroy	115.0		

Walla Walla-North Yakima.

Walla Walla	0.0	Prosser	78.0
Sudbury	7.0	Grandview	91.0
Divide	26.0	Zillah	111.0
Wallula	29.0	Donald	120.0
Kennewick	45.0	Yakima	127.0
Kiona	63.0	North Yakima	132.0

North Yakima-Cle Elum.

North Yakima	0.0	Thorp	53.0
Pomona	9.0	Teanaway	65.0
Wenas	27.0	South Cle Elum	69.0
Ellensburg	41.0	Cle Elum	72.0

Cle Elum-Tacoma.

Cle Elum	0.0	Isaquah	90.0
Nelson	16.0	South Park	109.0
Laconia	43.0	Seattle	114.0
Edgewick	61.0	Christopher	146.0
Fall City	79.0	Tacoma	154.0

NEW TRANSPROVINCIAL ROAD TOUR

Trip From Montreal to Quebec, 172 Miles, Has Varied Interest From the Beginning to the End

THE road surface of this route is pavement to the end of the island of Montreal except for a short piece of macadam through Laval de Montreal. The remainder of the road to Three Rivers is good macadam or concrete, with one or two exceptions, where the macadam is somewhat worn.

This highway forms part of what is known as the New Transprovincial Road from Montreal to Quebec and is full of varied interests from beginning to end, consisting of quaint villages, typical habitation dwellings, besides many way-side shrines along the highway.

The following route is presented by the Quebec Automobile Touring Book, just issued under the auspices of the Automobile Club of Canada:

MONTREAL TO THREE RIVERS. 92.2 Miles.

- Miles
- 0.0 MONTREAL, Place Viger Depot and hotel on right S. O. East along Craig St.
 - 0.5 Slight jog right into Notre Dame St., and follow to end of island. On left is Old City Prison.
 - 1.1 Logueville Ferry on right (Poupart St.).
 - 1.3 Dominion Textile Works on right and also at 2.1.
 - 2.5 Malsonneuve limits.
 - 2.5 St. Lawrence Sugar Refineries on right.
 - 2.6 Ferry to King Edward Park.
 - 2.7 CITY OF MAISONNEUVE. Fire Station on right.
 - 3.3 Canadian Vickers Ltd. Works on right. Enter Mercier Ward (City of Montreal).
 - 3.4 Go under RR.
 - 3.9 Montreal Locomotive Works on left.
 - 4.5 Dominion Amusement Park on right.
 - 4.5 Hospice St. Jean de Dieu on left.
 - 5.3 Longue Pointe Parish Church on right (formerly old parish of Longue Pointe, now incorporated in Mercier Ward, City of Montreal).
 - 6.3 Cross car tracks and also at 6.5.
 - 7.0 Canada Cement Works on left.
 - 7.3 Cross RR Siding.
 - 7.8 Imperial Oil Co.'s refineries on left.
 - 7.9 Cross tracks.
 - 8.4 Club Champetre on right (visitors admitted).
 - MONTREAL EAST.
 - 8.7 Limits of Point aux Trembles.
 - 9.1 POINT AUX TREMBLES, City Hall on left.
 - 9.7 Limits Municipality of LAVAL DE MONTREAL.
 - 12.9 Cross RR.
 - 13.0 S. O. (Road on left leads to Riviere des Prairies and Sault au Recollet).
 - 13.3 Cross electric car tracks.
 - 13.3 Turn square right (at 13.5 continue S. O. for Bureau's Hotel at 13.8).
 - 13.5 Proceed under RR arch and immediately turn square left over iron bridge, crossing Ile Bourdon, and over second long bridge to the main land at 14.4.
 - 14.5 Bear right across RR and through village of CHARLEMAGNE.
 - 15.0 St. Paul l'Ermite limits.
 - 17.1 Parish Church ST. PAUL L'ERMITE on left.
 - 19.0 Limits of L'ASSOMPTION.
 - 22.4 Turn square left on Notre Dame St.
 - 22.9 Four Corners, turn square right along

- L'Ange Gardien Boulevard.
 - 23.0 Cross Iron Bridge over L'Assomption River.
 - 23.7 At end of road square right. (Road on left leads to Joliette).
 - 23.9 Four Corners S. O.
 - 26.3 At end of road square left through ST. SULPICE.
 - 26.6 Caution left and right curves.
 - 27.6 ST. SULPICE, Church on left.
 - 31.6 Over small wooden bridge.
 - 31.9 Right Curve.
 - 33.2 LAVALTRIE, Parish Church on left.
 - 38.9 LANORAIE, ruins of Parish Church on left.
 - 46.6 Through covered bridge.
 - 47.1 BERTHIERVILLE, concrete road.
 - 47.5 Berthierville Park on left.
 - 47.8 C. P. R. Depot on left (ferry on right to Sorel).
Fare 50 cents. Motors, \$3. Runs at 11:30 a. m. and 5 p. m. daily except Sundays.
 - 47.9 Manoir de Berthier on left.
 - 48.1 Square left.
 - 48.2 Four corners square right.
 - 48.4 Through covered bridge.
 - 50.2 CAUTION for sharp left curve.
 - 51.5 Square right through covered bridge and immediately square left.
 - 51.7 Cross RR ST. CUTHBERT station on right.
 - 53.1 Bear slightly to right.
 - 53.3 End of road curve to right.
 - 55.4 ST. VIATEUR, Parish Church on right.
 - 58.3 ST. BATHELEMI, Church on right.
 - 64.5 At fork left over iron bridge through village of MASKINONGE. Church on road to right.
 - 65.3 Cross RR.
 - 65.6 Sharp left curve.
 - 66.4 Cross RR and again at 68.
 - 68.3 Cross small iron bridge and S. O., avoiding left hand road.
 - 68.6 LOUISEVILLE, P. O. on right.
 - 68.8 Cross iron bridge and immediately turn square left along Riviere du Loup.
 - 69.2 Cross RR.
 - 72.3 Limits of Yamachiche.
 - 73.7 Cross RR.
 - 74.6 Four corners sharp curve left and through village of YAMACHICHE.
 - 75.3 Four Corners S. O.
 - 75.4 Sharp right and left curves.
 - 75.9 Cross RR.
 - 76.1 Bear right over bridge.
 - 76.8 Cross wooden bridge.
 - 77.3 Cross RR.
 - 77.8 Sharp left curve.
 - 79.2 Cross RR.
 - 80.5 End of road curve right.
 - 80.6 Avoid left hand road and cross RR at 81.
 - 83.5 POINTE DU LAC, Parish Church on left.
 - 84.1 Cross Little Sahara Desert.
 - 91.6 Cross RR siding and proceed along Notre Dame St.
 - 91.9 Four corners S. O. (Ferry for St. Angele on right at foot of Desforges St. Left leads to Dufresne's Hotel).
 - 92.2 THREE RIVERS. Four corners. Notre Dame and Banaventure Sts. Sacred Heart Monument on right.
- ### THREE RIVERS TO QUEBEC. 79.6 Miles.
- 0.0 THREE RIVERS, Sacred Heart Monument on right, just beyond turn square left along Lavolette St.
 - 0.1 Sanatorium Hotel on left.
 - 0.2 Court House on right.
 - 0.7 Four Corners, square right along St. Maurice St., following car tracks.
 - 0.8 Wabaso Cotton Mills on left. Also Notre Dame Church.
 - 0.9 RR tracks.
 - 1.1 Canada Iron Foundries on right.

- 1.2 Cross iron bridge over St. Maurice river.
- 1.6 Over electric tracks and immediately across second long iron bridge.
- 1.8 Sharp turn to right, on concrete road through CAP DE LA MADELEINE. (S. O. leads to Shawinigan Falls.)
- 2.2 Cross RR.
- 2.3 Sharp right and left curves. Wayagamack Pulp and Paper Mills over river on right.
- 3.9 Cross two sets of RR tracks.
- 12.3 Village of CHAMPLAIN.
- 12.6 Parish Church on left.
- 13.2 Left at fork, following good road.
- 15.5 Cross iron bridge and then left.
- 18.8 BATISCAN, Parish Church on left.
- 19.2 Wharf on right for Montreal and Quebec steamers.
- 19.4 Hotel Batiscan on left. Keep to right, road on left leads to station.
- 20.4 Keep to left through timber yard.
- 20.5 End of road turn right on to Parish Ferry crossing Batiscan river. Fare 25 cents. On leaving ferry turn square right up incline.
- 24.4 Sharp right turn along concrete through ST. ANNE DE LA PERADE.
- 24.6 Up incline over iron bridge, then right curve across second iron bridge. Toll 25 cents crossing St. Anne Marie bridge. Opposite church turn square right at 24.8.
- 21.9 Limits of GRONDINES.
- 33.1 Parish Church on right.
- 33.5 Up incline.
- 34.0 Avoid left hand road.
- 36.4 Sharp curve right and steep descent semi-circling over bridge and curving right up steep grade through DESCHAMBAULT, passing P. O. on right at 37.7.
- 38.4 Sharp left and right curve over bridge. CAUTION.
- 39.9 Keep to left, passing Hotel Deschambault.
- 41.1 Cross RR.
- 43.0 PORTNEUF Village.
- 43.5 Station on right.
- 43.7 Down grade and immediately right over bridge and up incline.
- 44.4 Up incline.
- 48.3 Village of CAP SANTE.
- 48.6 Keep to right up incline. Church on left.
- 48.9 Keep to right at reverse fork.
- 50.3 Bear left across new iron bridge, Donnacona Pulp and Paper Mills on right.
- 51.0 DONNACONA, hotel on right.
- 52.6 Les Ecureuils, church on right. Long upgrade.
- 55.5 POINT AUX TREMBLES WEST, Post-office on right.
- 58.9 NEUVILLE Parish Church on left.
- 62.2 Sharp left and right curves.
- 65.7 ST. AUGUSTIN, Parish Church on right.
- 66.8 Limits Old Turnpike Trust Road.
- 69.0 Cross RR.
- 71.3 LORETTE STATION on left. Turn square right along Suede Road.
- 72.4 Cross RR.
- 73.1 Cross RR.
- 73.9 End of road, turn square left along St. Foye road, passing St. Foye Church on right at 74.2.
- 75.8 Belmont Cemetery on left.
- 76.2 Old Toll Gate.
- 76.4 Convent Notre Dame de Bellevue.
- 77.5 Monument aux Braves. Turn square right into Battlefields Park and along Avenue aux Braves.
- 77.9 Square left along St. Louis Road and Grande Allee.
- 79.2 Provincial Parliament Buildings on left.
- 79.3 Garrison Club on right. Through St. Louis Gate.
- 79.6 QUEBEC. Place d'Armes Square.



Left—Featherweight, Oiled Silk, Soli Coat; Courtesy Franklin Simon & Co., New York City. Centre—Pontine Motoring and Trapshooting Suit. Right—Modish Road Costume of La Jerz.

EACH year motor tours have been becoming more and more popular with the woman who can afford the luxury of indulging in this ideally delightful manner of traveling. Nowadays the accomplished woman of the smart set must be capable of driving her own motor car. To the list of popular athletic pastimes, such as sailing a boat, riding horse back, driving a four-in-hand, playing tennis and golf and being an expert swimmer, the driving of the motor car has been added. The devotee must be versed in mechanical phraseology and must show intelligent interest in the manipulation of her car, if indeed she does not drive it herself. A good all-around motorist is the popular woman of 1917.

The popular journey is now the motor trip. Before the motor car was the mechanically perfected vehicle it now is, people who were beginning to use motor cars were afraid to start away on a long trip because of fear of troubles likely to arise. But it is rare indeed at the present time to find the motorist who does not feel full confidence in his car, and who looks forward to the long tours in keen anticipation, and usually the result is a delightful and much enjoyed holiday.

How Little to Take.

When the motor woman begins planning her wardrobe for a tour she should not consider how much she can take, but how little. It is quite possible for a woman to travel in a motor car for six weeks and be as dainty and fresh in her apparel with a few well chosen garments

as though she was accompanied by a trunkful of clothes. The personal equation must, however, enter prominently into any discussion of woman's motor traveling outfits. There are women who consider a motor trunk is riotous indulgence and excess in luggage carriers and would serenely start away on an extended tour with only the contents of a large suit case and traveling roll to furnish them with toilettes. There are other women who travel by motor, and have a half dozen pieces of luggage sent on by express, who firmly believe that they are only taking along what they actually need. It all depends upon the point of view, the distance to be traveled and the time the motor tourists are to be away, but extremes of either kind are unwise. It is foolish to travel by motor car without the clothes that will enable one to be appropriately dressed for the occasion that must necessarily be met with, and if the woman who prides herself on cutting down her luggage to the minimum did but realize it, frumpiness of attire will exclude her from many a pleasant time which she might otherwise enjoy.

First Aid to Sociability.

It is all very well to look independent and to quote "A man's a man for a' that," but the fact still remains that with good manners and an air of respectability as the basis, becoming and attractive dress will do far more toward letting one in for agreeable acquaintances than any other thing. A casual motoring acquaintance has no opportunity to probe for moral virtues, but one can tell at a glance whether a frock or hat is becom-

ing or a coat is in good taste and appropriate. Leaving out of the question the motor woman who goes touring for a round of visits, or a sort of travel that calls for an elaborate and varied wardrobe, and also leaving out of the question, too, the woman who does not carry enough to really make herself presentable, I will consider the needs of the average woman who is to take the ordinary summer motor tour.

She can, of course, get along with very little and the character of the items must be determined by the amount she can afford to spend on her clothes for the car. Roughly speaking, two frocks, a good looking cover all coat, a smart dinner frock to be worn at the hotels, a modish and practical suit, four suits of underwear, two petticoats, a hat, a supply of vells and as many of the little toilet accessories as one wants, has room for and can afford. There are some women who look horror stricken at the idea of a motor tourist's wardrobe limited to four suits of underwear, and if one has room for them more can be tucked in, but in these days of silk underwear—or the fine crepe—which may be so quickly done up it really seems useless to take up valuable space with a large supply of lingerie.

A Schedule for the Road.

The frocks for road wear may very well be smart little one-piece affairs of La Jerz, serge, Sportoplin or satin. The finely checked tweeds of light weight are also good. The exact cut is a matter of individual taste. A frock of this type should, of course, be plain and somewhat

severe, as it has more distinction for motoring wear than any elaborate model, and with smartly dressed motor women the latter has decidedly lost caste for such wear. In buying the motor frock there are some very good looking ready made models in the La Jerz, shown in some of the high class shops, many of which are rendered particularly fetching by having just enough embroidery to emphasize their modishness. La Jerz is a very practical and popular jersey cloth and is absolutely non-stretchable, therefore, it will not sag. It is a silk and wool jersey, being neither all silk nor all wool. It also possesses the splendid quality of neither wrinkling or mussing when worn in the car for a long period of time and may be had in all fashionable shades.

For the suit there are many admirable materials, but again jersey cloth is to be recommended for several very practical reasons. Warmth and serviceability is combined with lightness of weight and attractiveness and it is just about the right thickness over which the coat may be worn with comfort and good style. The model represented is particularly effective and very new in all its details. The motor woman who may appear in this costume when she slips off her outside coat may feel well satisfied that she is entirely up to the minute in her appearance.

For the cover-all coat for summer touring nothing has ever been shown that can quite equal the new garment of oiled silk which comes in all the modish shades of the season and is remarkably light in weight. These coats are full length and on loose, straight lines. The collars are built high and close fitting and button snugly around the throat.

Every motorist includes in her touring equipment one warm heavy coat of burella, velour, bolivia or some equally wooly material and a silk or wool sweater coat that she may use upon a particularly cool day or during an evening ride by the ocean or in the mountains.

Regarding the underwear for a tour the finer the better. My suggestion would be to carry a pair or two of the new Vanity Fair silk pajamas, some of the dainty envelope chemise, an evening vest, a chamisole or two, and a couple of silk petticoats. The Vanity Fair glove silk cannot be excelled for the motor woman's wear. It is made on splendid lines and has distinction and exclusiveness. It requires less room in packing

and is more comfortable to wear. It also saves laundry bills, for the silk underwear can be washed out in a few moments and will dry overnight and can be worn without ironing. The motor tourist will find this a great advantage over waiting for laundry work to be done. And beside the advantages stated above every woman who includes silk underwear in her outfit knows well the delight of wearing it. Petticoats should be of crepe de chine or some other very soft material, while some motor women dispense with the petticoat altogether and are wearing the Vanity Fair glove

are some smart little motor hats made entirely of gros grain ribbon sewed on in rows with a regular basting stitch. Any motor woman who is handy with her needle can very easily make one if she cares to do so. With a hat frame of the desired shape she may sew row after row of the ribbon onto it until the shape is entirely covered. Add a smart ornament or perky bow and milady has an exclusive hat which would cost her many dollars at any smart shop.

The motor woman who tours knows the convenience and necessity of a wristlet watch, and the finest thing in its line

that I have seen is the new Gruen. It is decidedly artistic as well as thoroughly reliable. It comes in white gold, green or yellow gold, platinum and also in gold filled and silver and may be had in oval, square or round. With one of the Gruen watches in one's possession they are not dependent upon servants for calls in the morning and is always on the wrist when touring, where it is easily obtainable. There is nothing more provoking when touring in the mountains or a rural section far away from habitation to find that the only watch in the party has stopped, and this is something that frequently happens. Sometimes, of course, it is the motorist's own fault, for watches must be wound and attended to, but then again, sometimes it is the fault of an inaccurate timepiece.

Among the little motoring accessories I find

a motor powder puff which every woman would love to possess. The powder is carried inside the puff and a gentle pressure of the puff to the skin forces the powder by pneumatic action through the porous fabric. There is no flying powder over the clothing. They are enclosed in a leather case.

Every motor woman is delighted to learn of a new and exclusive perfume and the most distinctive one, preferred by the woman of discrimination, is the delightful La Boheme. Extract, Toilet Water, Face Powder, Talcum Powder and Sachet Powder, may all be had put up in the most attractive containers. Lilas Arly is another that brings a breath of the great purple clusters of lilacs, while Mavis and Lady Mary may both be recommended and will please the woman of fastidious taste.

A sweater, which could almost be called a blouse, was shown me at one of the smart shops. There are also some very new ones of Sportoplin and Sportussah.



Gold and Crystal Headed Fringe
Crepe Meteor and Chiffon Dinner
Gown Evolved by Buzenet.

Vanity Fair Glove Silk Pajamas
Used in Slumberland by Very Mod-
ish Women Tourists.



Wrist Watch; Courtesy Gruen Watch Mfg. Co.,
Cincinnati, O.

silk knickers instead with satisfaction.

There are so many smart little motor hats this season which fit down well over the head that the motor woman need follow no set rules for her motor chapeau. Many of the styles tend toward the military both in shape and in the trimmings. It is advisable to have but little trimming, a flat bow of velvet, faille or satin, some close little wings, or a handsome ornament are all that is required. There

MOTOR CAR LAWS OF INTEREST TO TOURISTS

State	Registration	With Whom	Fees	Driver Chauffeur	Requirements	Speed Regulations.	
						Bus. Recs.	Out-Maxi-
Alabama	Annual	Sec. of State, Montgomery	\$7.50-\$20	\$5.00	No examination	Reciprocity	10 15 30
Alaska	Annual	Sec. of State, Phoenix	\$5-\$15	\$5.00	None	Six months	10 15 30
Arizona	Annual	Sheriff of County	\$10	\$1.00	No examination	Exempt	15 20 30
Arkansas	Annual	Mot. Veh. Dept., Sacramento	\$40c H. P.	\$2.00	No examination	Three months	10 15 20 30
California	Annual	Sec. of State, Denver	\$2.50-\$10	\$2.00	No examination	90 days	..
Colorado	Annual	Sec. of State, Hartford	\$2.50-\$10	\$2.00	No examination	30 days	..
Connecticut	Annual	Sec. of State, Dover	\$2.00	\$2.00	No examination	Reciprocity	15 7 25 25
Delaware	Annual	Tax Collector of County	\$2 500 lbs.	\$2.00	No examination	Reciprocity	..
Florida	Annual	Sec. of State, Atlanta	\$3	\$2.00	None	30 days	..
Georgia	Annual	Sec. of State, County	\$3-\$5	\$2.00	No examination	30 days	..
Idaho	Annual	Assessor of County	\$15-\$40	\$2.00	Chauffeur's examination	Reciprocity	..
Illinois	Annual	Sec. of State, Springfield	\$3-\$10	\$5.00	Examination, chauffeurs only	60 days	10 15 20 25
Indiana	Annual	Sec. of State, Indianapolis	\$5-\$20	\$2.00	Examination, chauffeurs only	60 days	10 15 20 25
Iowa	Annual	Sec. of State, Des Moines	\$40c H. P.	\$2.00	None	Reciprocity	..
Kansas	Annual	County Treasurer	\$5	\$2.00	No examination	30 days	10 12 25
Kentucky	Annual	Com. of Mot. Veh., Frankfort	\$6-\$20	\$2.00	Examination, chauffeurs only	Reciprocity	10 15 20
Louisiana	Annual	Sec. of State, Baton Rouge	\$5-\$15	\$2.00	Examination optional with sec.	Reciprocity	12 10 25
Maine	Annual	Sec. of State, Augusta	\$5-\$15	\$2.00	Examination optional with com.	14 days	12 12 18
Maryland	Annual	Com. of Mot. Veh., Baltimore	\$50c H. P.	\$2.00	Examination for chauffeurs	Reciprocity	10 15 20
Massachusetts	Annual	State High. Com., Boston	\$5-\$25	\$2.00	No examination	90 days	10 15 25
Michigan	Annual	Sec. of State, Lansing	\$5-\$25	\$2.00	Examination	30 days	8 15 25
Minnesota	Triennial	Sec. of State, St. Paul	\$1.50	\$1.50	No examination	60 days	8 15 30
Mississippi	Annual	State Auditor, Jackson	\$2.00	\$2.00	No examination	20 days	8 8 8
Missouri	Annual	Sec. of State, Jefferson City	\$2-\$12	\$1.50	No examination	Exempt	..
Montana	Annual	Sec. of State, Helena	\$5-\$15	\$2.00	No license	30 days	6 8 12 25
Nebraska	Annual	County Treasurer	\$3	\$2.00	Examination	30 days	..
Nevada	Annual	Sec. of State, Carson City	\$3-\$8	\$2.00	Examination	10 days	15 15 25
New Hampshire	Annual	Com. of Mot. Veh., Concord	\$10-\$40	\$3.00	Examination	15 days	12 12 25
New Jersey	Annual	Com. of Mot. Veh., Trenton	\$4.50-\$15	\$3.00	Examination, chauffeurs only	60 days	..
New Mexico	Annual	Sec. of State, Santa Fe	\$2-\$12	\$1.00	None	Reciprocity	..
New York	Annual	Sec. of State, Albany and New York	\$5-\$25	\$1.00	Examination, chauffeurs only	60 days	10 15 25
North Carolina	Annual	Sec. of State, Raleigh	\$5-\$10	\$2.00	None	Exempt	10 10 30
North Dakota	Annual	Sec. of State, Bismarck	\$6 up	\$2.00	None	Reciprocity	8 15 20
Ohio	Annual	Sec. of State, Columbus	\$3-\$5	\$2.00	Examination, chauffeurs only	30 days	..
Oklahoma	Annual	High. Com., Oklahoma City	\$50c H. P.	\$2.00	No examination	Reciprocity	..
Oregon	Annual	Sec. of State, Salem	\$3-\$10	\$2.00	No examination	30 days	..
Pennsylvania	Annual	State High. Dept., Harrisburg	\$5-\$20	\$2.00	Affidavits	Reciprocity	15 15 24
Rhode Island	Annual	State Bd. Pub. Roads, Providence	\$5-\$25	\$1.00	Show knowledge	10 days	15 15 25
South Carolina	Annual	Clerk County Court	\$1	\$1.00	None	Not exempt	15 15 25
South Dakota	Annual	County Treasurer	\$3	\$2.00	None	Reciprocity	15 15 25
Tennessee	Annual	State Dept. of Highways, Nashville	\$30c H. P.	\$2.00	None	30 days	8 8 18
Texas	Annual	County Clerk	\$5c H. P.	\$2.00	None	30 days	..
Utah	Annual	Sec. of State, Salt Lake City	\$5-\$15	\$2.00	No examination	Reciprocity	10 10 25
Vermont	Annual	Sec. of State, Montpelier	\$1 H. P.	\$2.00	Examination optional with sec.	14 days	8 10 20
Virginia	Annual	Sec. of Commonwealth, Richmond	\$5-\$20	\$2.50	No examination	90 days	12 20 24
Washington	Annual	County Auditors	\$5-\$10	\$3.00	None	Reciprocity	15 15 25
West Virginia	Annual	State Road Com., Charleston	\$5	\$2.00	None	Reciprocity	15 15 25
Wisconsin	Annual	Sec. of State, Madison	\$5	\$2.00	None	Reciprocity	15 15 25
Wyoming	Annual	Sec. of State, Cheyenne	\$5	\$2.00	None	Reciprocity	15 15 25
Dls. of Columbia	Perpetual	Auto. Board, Washington	\$2	\$2.00	Examination	Reciprocity	12 12 15

In connection with the rates of fees in the above tabulation, following addenda will be found important:

Alabama: Under 25 H. P. \$7.50; 25-30 \$12.50; under 40 \$17.50; 40 or more \$20. Electric \$12.50. Steam \$15. Arkansas: 25 H. P. and less, \$5; 25-40, \$10; over 40, \$15. California: Electric, \$5. Colorado: Up to 20 H. P. \$2.50; 20-40, \$5; 41 and up, \$10. District of Columbia: Annual after Jan. 1, 1918. Florida: Less than 10 H. P. \$3; 11-25, \$5; 30-40, \$10; 41-50, \$15; 51-60, \$20; 61-70, \$30; over 70, \$50. Georgia: 25 H. P. or less, \$3; 26-40, \$4; over 40, \$6; electric, \$4. Idaho: 2000 lbs. or less, \$15; 2000-3000 lbs., \$20; 3000-4000, \$30; over 4000 lbs., \$40. Illinois: 10 H. P. or less, \$3; 11-25, \$5; 26-35, \$6; 36-50, \$8; over 50, \$10; electric, under 20 tons, \$5; over \$10. Indiana: Up to 25 H. P., \$5; 26-40, \$8; 41-50, \$16; over 50, \$20; electric, \$5. Iowa:

20 H. P. or less, \$8; over 20, 40c per H. P.; steam or electric, \$15. Kentucky: Less than 25 H. P., \$6; less than 50, \$11; 50 and over, \$20. Maine: 20 H. P. and under, \$5; 21-25, \$10; over 25, \$15. Maryland: 10 H. P., \$5; 20 \$10; 30, \$15; 40, \$20; over 40, \$20. Massachusetts: Under 20 H. P., \$5; 20-25, \$10; 30-39, \$15; 40-49, \$20; 50 and up, \$25. Michigan: 25c for each 100 pounds of weight in addition to H. P. rate. Minnesota: \$2 per vehicle and 36c per horsepower; electric, \$4.80. Missouri: Up to 12 H. P., \$2; 12-23, \$3; 24-35, \$5; 36-47, \$7; 48-59, \$8; 60-71, \$10; 72 and up, \$12. Montana: Under 25 H. P., \$5; 25-30, \$10; exceeding 30 H. P., \$15. Nevada: 20 H. P. or less, \$3; 21-40, \$5.50; over 40, \$8. New Hampshire: Up to 15 H. P., \$10; 16-30, \$15; 31-40, \$20; 41-50, \$25; 51-60, \$30; over 60, \$40. New Jersey: 10 H. P. or less, \$4.50; 11-29, \$7.50; 30 or more, \$15. New Mexico: Less than 12 H. P., \$3; 12-19, \$4; 20-29, \$6; 30-39, \$8; 40-49, \$10; 50 or more, \$12. New York: 25 H. P. or less, \$5; 25-35, \$10; 35-50, \$15; 50 and up, \$25. North Carolina: Up to 20 H. P., \$5; 20-40, \$7.50; over 40, \$10. North Dakota: Up to 20 H. P., \$6; 20-40, \$10; 40-50, \$15; 50 and up, \$20. Oklahoma: 50c per H. P. first year; 40c second; 30c third; 20c thereafter. Oregon: Electric, \$3 and \$5; others, 26 horsepower, \$8; 27-36, \$5; 37-40, \$7.50; 40 and up, \$10. Pennsylvania: Up to 20 H. P., \$5; 20-35, \$10; 35-50, \$15; 50 and up, \$20. Rhode Island: 15 H. P. and less, \$5; over 15, \$10; over 30, \$15; over 40, \$25. Texas: After 30 days in state non-residents must pay \$1. Utah: 25 H. P. and under, \$5; 26-40, \$10; over 40, \$15; electric, \$10. Vermont: First year, \$1 per H. P.; second, 75c; third, 50c. Washington: 25 H. P. and under, \$5; 25-40, \$7.50; 40 and over, \$10.00. West Virginia: vehicles under 2000 lbs., \$10; 25c additional for each 100 lbs.

MISSISSIPPI VALLEY AND MISCELLANEOUS TOURS

From the National Capital to the Gulf of Mexico, Along
Meridians of the Broad Prairies and In Far Off Canada

ALTHOUGH not a mid-summer tour, that designated as "Washington-New Orleans," is taken by many during the fall and winter and particularly around Mardi-Gras time in the Crescent City, when thousands gather there from all over the country to participate in the great festival that lasts throughout a week with parades, fetes, banquets, masquerades, tableaux and pyrotechnical displays. This carnival is the most elaborate in the world that is repeated annually and naturally has attracted thousands from all over the world in peace times. It was instituted over 100 years ago and has been repeated annually since that time with ever increasing popularity.

New Orleans is also a great shipping port, vessels leaving its wharves for all points in the world laden with cotton and other products of the Mississippi valley. It also holds a leading place historically, having been associated with many fa-

Winston-Salem and Charlotte, N. C.; Greenville, S. C.; Atlanta, Ga.; Montgomery, Thomaston and Mobile, Ala.; Gulfport, Miss.; New Orleans, La. Eleven Days, 1425.8 Miles.

Washington-Richmond.

Miles	Miles
Washington... 0.0	Fredericksburg... 59.4
Alexandria, Va. 7.3	Massaponax... 68.8
Lorton... 19.4	Castelman's Mill 74.7
Ocequan... 22.9	Golansville... 87.9
Dumfries... 33.6	Ashland... 104.3
Stafford... 50.0	Richmond... 121.6

Richmond-Henderson.

Miles	Miles
Richmond... 0.0	Thelma... 102.9
Petersburg... 22.7	King's Cross... 103.9
Carson... 37.6	Ronda... 105.2
Loco... 51.6	Sunlight... 110.5
Jarrat... 57.4	Littleton... 116.3
Emporia... 67.3	Vaughan... 121.7
Brink... 75.0	Macon... 127.4
Barley... 81.9	Warrenton... 132.2
Roanoke Rapids, N. C. 93.7	Afton... 145.9
Holden... 96.1	

Greenville-Atlanta.

Miles	Miles
Greenville... 0.0	Jefferson... 118.1
Oak Grove... 9.4	Winder... 118.7
Piedmont... 11.6	Carl... 124.7
Anderson... 32.6	Lawrenceville... 137.0
Fair Play... 55.6	Snellville... 144.4
Lavonia, Ga. 65.8	Stone Mountain 154.8
Bowersville... 71.4	Clarkson... 159.8
Canon... 73.8	Scottdale... 161.9
Royston... 78.3	Inglewood... 163.0
Franklin Spgs. 80.5	Dacula... 164.6
Pocotaligo... 93.2	Kirkwood... 166.5
Commerce... 105.7	Atlanta... 170.7
Apple Valley... 110.2	

Atlanta-Montgomery.

Miles	Miles
Atlanta... 0.0	La Grange... 74.9
College Park... 8.9	West Point... 90.2
Red Oak... 12.6	Langdale... 95.1
Fairburn... 19.7	Beulah... 105.6
Palmetta... 26.0	Opelika... 120.0
McCullom... 31.4	Tuskegee... 146.5
Madras... 34.3	La Place... 158.8
Newman... 41.0	Shorter... 163.9
Moreland... 48.5	Meigs... 175.2
St. Charles... 50.0	Montgomery... 187.7
Grantville... 54.4	



Beautiful Country Club in the Uptown Residential Section and Typical of Modern New Orleans.

mous incidents in the history of the country.

Many old structures that have stood against the ravages of time are still in existence. These buildings have housed officials and men of four different nations. First the French tri-color floated over the city. Later the Spaniards were in possession and ruled the settlement. Next came the Stars and Stripes, which were temporarily displaced by the flag of the Confederacy.

The city teems with places of interest and is a beautiful residential place, having many homes of wonderful old architecture set amid examples of landscape gardening that can be seen nowhere else in this country.

New Orleans citizens are good roads enthusiasts and the highways leading into the city are rapidly being converted into modern boulevards.

Motorists coming northward to the summer resorts use this route with much pleasure and satisfaction.

ITINERARY.

WASHINGTON-NEW ORLEANS.

Night Stops—Richmond, Va.; Henderson,

Henderson-Winston-Salem.

Miles	Miles
Henderson... 0.0	Graham... 86.4
Oxford... 11.7	Burlington... 89.3
Providence... 17.4	Gibsonville... 96.0
Tallyho... 22.6	Whitsett Cross Roads... 98.7
Stem... 28.9	Greensboro... 112.3
Knaapp of Reeds 28.6	Gulldford... 118.0
Bragtown... 40.2	Summerfield... 124.7
Durham... 43.5	Kernersville... 136.4
Chapel Hill... 55.6	Centerville... 146.2
White Cross... 64.6	Winston-Salem 148.5
Saxapahaw... 74.3	

Winston-Salem-Charlotte.

Miles	Miles
Winston-Salem 0.0	Landis... 46.5
Midway... 13.7	Kanapolis... 51.2
Brinkleys... 16.9	Concord... 59.1
Lexington... 23.9	Pharr's Mill... 65.3
Spencer... 38.5	Newell... 73.7
Salisbury... 41.3	Charlotte... 81.5
China Grove... 44.1	

Charlotte-Greenville.

Miles	Miles
Charlotte... 0.0	Cowpens... 71.0
Sloan's Ferry. 10.9	Converse... 74.1
Belmont... 12.6	Spartanburg... 80.5
Lowell... 17.3	Fair Forest... 85.8
Gastonia... 22.8	Tucapau... 92.3
Bessemer City. 29.6	Duncan... 96.9
King's Mtn... 35.6	Greer... 102.0
Grover... 43.7	Taylors... 107.4
Blackb'g, S. C. 50.0	Greenville... 117.3
Gaffney... 59.1	

Montgomery-Thomasville.

Miles	Miles
Montgomery... 0.0	Martins... 72.5
Prattville... 13.8	Safford... 76.7
Autaugaville... 25.5	Central Mills... 81.5
Mulberry... 34.2	Corley... 84.0
Statesville... 37.7	Consul... 88.5
Burnsville... 41.2	Thomaston... 93.2
Seima... 50.2	Octagon... 103.7
Beloit... 62.3	Shiloh... 109.9
Hasen... 65.4	Clay Hill... 118.1
Orrville... 69.3	Thomasville... 127.2

Thomasville-Mobile.

Miles	Miles
Thomasville... 0.0	Chastang... 81.8
Grove Hill... 16.4	Axis... 90.2
Jackson... 33.3	Creola... 92.3
Leroy... 40.0	Pennsylvania... 93.5
McIntosh... 62.7	Saraland... 97.3
Malcolm... 69.5	Plateau... 103.7
Calvert... 73.1	Mobile... 106.9
Mount Vernon. 78.3	

Mobile-Gulfport.

Miles	Miles
Mobile... 0.0	W. Pascagoula 41.7
Mertis, Ala... 4.0	Ocean Springs. 52.3
Orange Grove, Miss. 34.0	Billoxi... 71.0
Pascagoula... 39.8	Mississippi City 80.6
	Gulfport... 84.0

Gulfport-New Orleans.

Miles	Miles
Gulfport... 0.0	Poplarville... 53.5
Long Beach... 3.1	Bogalusa... 88.7
Pasq. Christian. 8.0	Clalborne... 116.8
Cuevas... 10.6	Covington... 117.4

Vidalia	22.1	Mandeville	127.4
Standard	27.8	New Orleans ..	134.5

ITINERARY. MERIDIAN ROAD.

Night Stops—Winnipeg, Fargo, Yankton, Salina, Wichita, El Reno, Wichita Falls, Ft. Worth, Waco, San Antonio, Laredo, Galveston.

Winnipeg-Fargo.

Miles		Miles	
Winnipeg	0.0	Minto	128.0
St. Norbert	10.0	Ardoch	135.0
Morris	41.5	Manville	146.9
Emerson Can.	69.3	Grand Forks ..	158.8
Pembina	73.1	Hillsboro	209.9
Grafton	117.1	Fargo	254.4

Fargo-Yankton.

Miles		Miles	
Fargo	0.0	Watertown	178.0
Abercrombie	33.0	Arlington	217.0
Wahpeton	51.5	Madison	245.0
White Rock	76.7	Salem	278.5
Sisseton	116.2	Bridgewater ..	295.5
Summit	146.5	Yankton	347.7

Yankton-Columbus.

Miles		Miles	
Yankton	0.0	Norfolk	67.0
Wausa	31.6	Madison	82.8
Pierce	52.6	Columbus	118.3

Columbus-Belleville.

Miles		Miles	
Columbus	0.0	Belvidere	95.7
Shelby	18.8	Hebron	103.2
Stromsburg	32.6	Chester	115.7
Bruning	89.2	Belleville	128.8

Belleville-Salina.

Miles		Miles	
Belleville	0.0	Minneapolis ..	55.1
Concordia	21.6	Salina	80.4

Salina-Wichita.

Miles		Miles	
Salina	0.0	Moundridge ..	57.9
Lindsborg	23.4	Newton	77.7
McPherson	37.5	Wichita	102.7

Wichita-El Reno.

Miles		Miles	
Wichita	0.0	Medford	80.5
Wellington	31.3	Kremmlin	103.1
South Haven	46.2	Enid	117.2
Caldwell	58.1	Hennessy	138.7
Renfrow	68.2	El Reno	186.7

El Reno-Lawton.

Miles		Miles	
El Reno	0.0	Verdon	58.6
Pocasset	37.0	Apache	87.7
Chicasha	47.9	Lawton	114.7

Lawton-Wichita Falls.

Miles		Miles	
Lawton	0.0	Toll House	42.9
Emerson	18.8	Burk Burnett ..	45.3
Randlett	33.9	Wichita Falls ..	60.3

Wichita Falls-Ft. Worth.

Miles		Miles	
Wichita Falls	0.0	Whitt	87.5
Windthorst	25.8	Weatherford ..	108.2
Antelope	39.0	Annetta	116.1
Jacksboro	65.3	Ft. Worth	142.2

Ft. Worth-Waco.

Miles		Miles	
Ft. Worth	0.0	Meridian	89.0
Cleburne	35.0	Clifton	101.0
Glenrose	62.0	Waco	140.0

Waco-San Antonio.

Miles		Miles	
Waco	0.0	Austin	131.0
Temple	53.0	San Antonio ..	213.0
Georgetown	105.0		

San Antonio-Laredo.

Miles		Miles	
San Antonio	0.0	Cactus	135.5
Pearsall	56.0	Nye	155.5
Cotulla	95.5	Laredo	164.6

Branch. Waco-Galveston.

Miles		Miles	
Waco	0.0	Navasota	145.0
Marlin	27.0	Hempstead	169.0
Hearne	93.0	Houston	221.0
Bryan	115.0	Galveston	273.0

ITINERARY. ST. LOUIS-CHICAGO.

Night Stops—St. Louis, Mo.; Springfield, Bloomington and Chicago, Ill. Three Days, 333.8 Miles.

St. Louis-Springfield.

Miles		Miles	
St. Louis	0.0	Stamton	44.6
E. St. Louis	2.1	Mt. Olive	51.0
Collinsville	12.9	Litchfield	61.9
Troy	15.9	Glenarm	93.5
Marysville	17.1	Cotton Hill	99.7
Edwardsville	25.4	Springfield	107.8
Hamel	33.6		

Springfield-Bloomington.

Miles		Miles	
Springfield	0.0	McLean	58.4
Williamsville	15.0	Shirley	69.6
Elkhart	23.0	Bloomington ..	76.5
Lincoln	37.5		

Bloomington-Chicago.

Miles		Miles	
Bloomington	0.0	Minooka	92.7
Towanda	8.2	Joliet	106.6
Lexington	18.3	Lockport	110.6
Pontiac	41.2	LaGrange	130.1
Odell	52.0	Forest Park ..	139.6
Dwight	60.1	Chicago	149.5
Morris	79.4		

ITINERARY.

NATIONAL PARKS HIGHWAY. BOSTON, MASS.-SEATTLE, WASH.

Night Stops—Boston, Mass.; Springfield, Albany, N. Y.; Utica, Rochester, Erie, Penn.; Cleveland, O.; Toledo, South Bend, Ind.; Chicago, Ill.; Madison, Wis.; La Crosse, St. Paul, Minn.; Alexandria, Fargo, N. D.; Jamestown, Bismarck, Dickinson, Terry, Mont.; Custer, Livingston, Butte, Drummond, Wallace, Idaho; Spokane, Wash.; Water-ville, Seattle. Thirty Days, 3486 Miles.

Boston-Springfield.

Miles		Miles	
Boston	0.0	Worcester	43.4
Auburndale	9.3	Spencer	54.4
S. Sudbury	20.0	Warren	67.4
Northboro	33.4	Springfield ..	94.4

Springfield-Albany.

Miles		Miles	
Springfield	0.0	Pittsfield	55.3
Westfield	8.8	W. Lebanon	70.3
Huntington	21.0	Nassau	79.1
Pera	41.4	Albany	92.0

Albany-Utica.

Miles		Miles	
Albany	0.0	St. Johnsville ..	61.7
Schenectady	15.0	Little Falls	72.2
Amsterdam	30.8	Herkimer	79.4
Fonda	41.5	Utica	95.0

Utica-Rochester.

Miles		Miles	
Utica	0.0	Savannah	86.0
Oneida	23.5	Lyons	100.9
Fayetteville	43.0	Palmyra	116.6
Syracuse	50.6	Fairport	128.0
Elbridge	66.1	Rochester	138.9

Rochester-Erie.

Miles		Miles	
Rochester	0.0	Buffalo	73.7
Bergen	18.1	Irving	102.5
Batavia	34.5	Brocton	124.6

Pembroke	47.7	Northeast	148.3
Williamsville	63.9	Erie	163.6

Erie-Cleveland.

Miles		Miles	
Erie	0.0	Madison	61.3
Conneaut	30.2	Palmeville	72.3
Ashtabula	44.7	Willoughby	83.0
Geneva	54.5	Cleveland	102.0

Cleveland-Toledo.

Miles		Miles	
Cleveland	0.0	Bellevue	70.6
Elyria	28.7	Woodville	109.3
Norwalk	57.3	Toledo	119.4

Toledo-South Bend.

Miles		Miles	
Toledo	0.0	Butler	84.9
Delta	32.8	Kendallville	106.4
Archbold	51.6	Goshen	142.6
Bryan	66.2	Elkhart	153.1
Edgerton	78.0	South Bend	163.4

South Bend-Chicago.

Miles		Miles	
South Bend	0.0	Valparaiso	49.4
New Carlisle	13.9	Dyer	74.1
La Porte	26.7	Hammond	83.9
Westville	38.6	Chicago	104.9

Chicago-Madison.

Miles		Miles	
Chicago	0.0	Racine	66.0
Evanston	13.3	S. Milwaukee	80.0
Hubbard's Hill	19.0	Milwaukee	89.4
Ravina Park	22.9	Brookfield	102.6
Highland Park	25.5	Waukesha	109.3
Lake Forest	32.0	Delafield	117.0
Waukegan	39.5	Johnson Creek ..	137.6
Zion City	45.7	Lake Mills	144.4
Kenosha	55.3	Madison	170.8

Madison-La Crosse.

Miles		Miles	
Madison	0.0	Union Center ..	79.5
Ashton	10.1	Elroy	84.1
Sauk City	24.9	Kendall	91.2
Baraboo	42.2	Ontario	104.8
Abelmann	51.6	Cashton	115.0
Reedsburg	59.8	Portland	120.8
Lavale	67.6	La Crosse	145.6

La Crosse-St. Paul.

Miles		Miles	
La Crosse	0.0	St. Charles	59.1
Ridgeway	21.0	Rochester	81.0
Witoka	24.6	Pine Island	99.1
Winona	34.1	Zumbrota	105.6
Lewiston	48.6	Cannon Falls ..	125.5
Utica	53.2	St. Paul	162.1

St. Paul-Alexandria.

Miles		Miles	
St. Paul	0.0	St. Cloud	76.2
Minneapolis	9.9	St. Joe	83.5
Osseo	22.2	Avon	90.8
Anake	28.4	Albany	97.9
Elk River	40.0	Melrose	112.9
Becker	56.9	Sauk Center	121.8
Clear Lake	63.9	Alexandria	148.7

Alexandria-Fargo.

Miles		Miles	
Alexandria	0.0	Fergus Falls	54.3
Garfield	7.1	Rothsay	77.2
Evansville	19.8	Barnesville	94.4
Melby	25.7	Fargo	124.2

Fargo-Jamestown.

Miles		Miles	
Fargo	0.0	Jamestown	99.0
Valley City	61.3		

Jamestown-Bismarck.

Miles		Miles	
Jamestown	0.0	Bismarck	108.5
Dawson	55.2		

Bismarck-Dickinson.

Miles		Miles	
Bismarck	0.0	Dickinson	120.2
Hebron	79.2		

Dickinson-Terry.

Miles		Miles	
Dickinson	0.0	Fallon	149.5
Seydinal Butte	60.4	Terry	160.7
Glendive	116.0		

For itinerary from Terry to Spokane, see Yellowstone Trail itinerary, which is over the same route.

Spokane-Waterville.

Miles	Miles
Spokane..... 0.0	Almira..... 80.7
Davenport..... 36.8	Coulee City..... 108.4
Creston..... 59.1	Waterville..... 145.4

Waterville-Cle Elum.

Miles	Miles
Waterville..... 0.0	Peshastin..... 47.2
Wenatchee..... 26.8	Cle Elum..... 91.1

Cle Elum-Seattle.

Miles	Miles
Cle Elum..... 0.0	North Bend..... 62.1
Easton..... 15.5	Redmond..... 86.3
Laconia..... 36.2	Seattle..... 112.0

ITINERARY.
PACIFIC HIGHWAY.

Night Stops—Vancouver, B. C.; Seattle and Chehalis, Wash.; Portland, Salem, Cottage Grove, Riddle and Medford, Ore.; Sisson, Redding, Chico and Sacramento, San Francisco, Paso Robles, Los Angeles, San Diego, Cal. Fourteen Days, 18,448 Miles.

Vancouver-Seattle.

Miles	Miles
Vancouver..... 0.0	Bow..... 62.0
New Westater 8.0	Mt. Vernon..... 72.0
Brownsville... 11.0	Conway..... 78.0
Blaine, Wash.. 26.0	English..... 98.0
Custer..... 34.0	Shohomsh..... 118.0
Baradale..... 39.0	Kenmore..... 128.0
Bellingham... 49.0	Seattle..... 188.0

Seattle-Chehalis.

Miles	Miles
Seattle..... 0.0	Rainier..... 75.0
Christopher... 32.0	Olympia..... 96.0
Tacoma..... 40.0	Centralia..... 127.0
South Tacoma. 51.0	Chehalis..... 131.0

Chehalis-Portland.

Miles	Miles
Chehalis..... 0.0	Carrollton..... 53.5
Cowlitz..... 18.2	Kalama..... 59.0
Toledo..... 20.1	Woodlawn Ferry 69.1
Castle Rock... 36.1	La Centre..... 74.7
Lexington..... 45.0	Vancouver..... 93.1
Kelso..... 46.5	Portland, Ore. 100.5

Portland-Salem.

Miles	Miles
Portland..... 0.0	Salem..... 94.0
Oregon City... 19.0	

Salem-Cottage Grove.

Miles	Miles
Salem..... 0.0	Junction City... 63.5
Jefferson..... 18.8	Eugene..... 77.0
Albany..... 28.0	Goshen..... 88.9
Hamsburg..... 58.8	Cottage Grove. 99.0

Cottage Grove-Riddle.

Miles	Miles
Cottage Grove. 0.0	Roseburg..... 55.1
Kreweon..... 15.2	Dole..... 68.1
Yoncalles..... 34.0	Myrtle Creek... 73.2
Oakland..... 37.8	Riddle..... 80.2

Riddle-Medford.

Miles	Miles
Riddle..... 0.0	Gold Hill..... 67.8
Wolf Creek... 28.3	Central Point... 77.7
Grant's Pass.. 48.5	Medford..... 84.0

Medford-Sisson.

Miles	Miles
Medford..... 0.0	Montague..... 39.0
Slaklyon Pass. 6.6	Edgewood..... 61.1
Coles..... 12.6	Weed..... 65.2
Hornbrook... 24.5	Sisson..... 75.1

Sisson-Redding.

Miles	Miles
Sisson..... 0.0	Southern..... 25.9
Shasta Springs 8.6	Kennett..... 68.9
Dunsmuir..... 11.9	Buckeye..... 79.0
Castle Brook.. 17.9	Redding..... 83.9
Castella..... 19.2	

Redding-Chico.

Miles	Miles
Redding..... 0.0	Proberta..... 41.3
Anderson..... 11.8	Vina..... 56.4
Cottonwood... 17.5	Chico..... 76.5
Red Bluff..... 33.9	

Chico-Sacramento.

Miles	Miles
Chico..... 0.0	Lincoln..... 82.4
Live Oaks..... 37.7	Roseville..... 92.6
Marysville... 50.5	Ben Ali..... 108.8
Wheatland.... 67.4	Sacramento... 114.0
Sheridan..... 71.8	

Sacramento-San Francisco.

Miles	Miles
Sacramento... 0.0	Livermore..... 95.1
Stockton..... 52.4	Oakland..... 130.7
French Camp... 57.4	San Francisco. 136.2

San Francisco-Santa Cruz.

Miles	Miles
San Francisco. 0.0	Santa Clara... 50.1
Colma..... 8.9	San Jose..... 54.0
San Mateo.... 23.0	Los Gatos..... 65.2
Redwood..... 29.6	Santa Cruz... 90.9

Santa Cruz-Paso Robles.

Miles	Miles
Santa Cruz.... 0.0	Chualar..... 51.0
Aptos..... 7.7	Soledad..... 65.5
Watsonville... 19.0	Bradley..... 129.0
Salinas..... 40.1	Paso Robles... 149.0

Paso Robles-Santa Barbara.

Miles	Miles
Paso Robles... 0.0	Sisquoc..... 75.4
San Luis Obispo 31.0	Los Olivos.... 97.1
Edna..... 37.2	Gaviota..... 117.6
Arroyo Grande 46.1	Goleta..... 143.6
Santa Maria... 62.2	Santa Barbara. 150.6

Santa Barbara-Los Angeles.

Miles	Miles
Santa Barbara. 0.0	El Rio..... 42.8
Carpenteria... 11.9	Hollywood..... 98.1
Ventura..... 34.4	Los Angeles... 105.8

Los Angeles-San Diego.

Miles	Miles
Los Angeles... 0.0	Irvine..... 47.2
Whittier..... 13.9	Oceanside..... 92.5
La Harba..... 22.9	Encinitas..... 104.8
Fullerton..... 28.0	La Jolla..... 121.6
Santa Ana..... 38.2	San Diego..... 136.1

ITINERARY.
PORTLAND-MONTREAL.

Night Stops—Portland, Augusta, Me.; Quebec, Montreal, P. Q. Three Days, 459.5 Miles.

Portland-Augusta.

Miles	Miles
Portland..... 0.0	Auburn..... 33.5
Morill's Cor... 3.1	Lewiston..... 33.9
Allen's Corner. 4.0	Greene..... 41.9
Gray..... 17.1	Winthrop..... 54.4
North Gray... 19.5	Manchester..... 60.3
U. Gloucester. 24.8	Augusta..... 64.8

Augusta-Lake Parlin.

Miles	Miles
Augusta..... 0.0	Solon..... 50.1
Waterville.... 19.6	Bingham..... 58.6
Fairfield Cen. 23.7	Carratunk..... 73.9
Skowhegan.... 36.0	The Forks..... 81.3
Lakewood..... 41.7	Lake Parlin... 97.0

Lake Parlin-Quebec.

Miles	Miles
Lake Parlin... 0.0	Beauceville... 67.9
Jackman, Me.. 12.7	Des Plantes... 71.4
Moose R., Me. 14.2	St. Joseph.... 77.8
Line House... 28.4	Beauce Junction 83.1
Armstr's, P. Q. 39.4	Ste. Marie..... 90.1
Jersey..... 56.1	Scott Junction. 95.2
St. George.... 58.0	St. Henri..... 109.9
Gilbert..... 65.0	Quebec..... 121.0

Quebec-Montreal.

Miles	Miles
Quebec..... 0.0	Pointe du Lac. 88.7
St. Augustin.. 14.3	Yamachiche... 97.0
Les Ecureuils. 28.5	Maskinonge... 111.1
Cap Sante.... 32.7	Berthier..... 125.3
Portneuf..... 37.8	Lanorite..... 134.5

Deschambault. 42.0	Lavaltrie..... 140.6
La Chevrotiere 46.8	St. Sulpice.... 146.3
Grandines.... 49.1	L'Assomption. 151.5
Champlain.... 66.0	Charlemagne. 160.3
Three Rivers.. 79.8	Montreal..... 176.7

ITINERARY.
MONTREAL-ALBANY.

Night Stops—Montreal, Ottawa, Kingston, Toronto, Can.; Buffalo, Syracuse and Albany, N. Y. Six Days, 846.2 Miles.

Montreal-Ottawa.

Miles	Miles
Montreal..... 0.0	Hawkesbury... 61.9
St. Laurent... 6.9	L'Original..... 65.0
Borde a Plouffe 11.0	Cassburna..... 67.5
St. Martin.... 12.6	Alfred..... 77.5
St. Eustace... 20.5	Plantagenet... 84.5
St. Benoit.... 31.8	Wendover..... 90.5
St. Placide... 38.2	Clarence..... 96.0
St. Andrews E. 46.6	Rockland..... 98.5
Carrillon..... 48.8	Cumberland... 103.5
Ferry to Point Fortune.	Orleans..... 110.5
Little Rideau. 54.2	Ottawa..... 121.0

Ottawa-Kingston.

Miles	Miles
Ottawa..... 0.0	Iroquois..... 53.0
S. Gloucester. 13.0	Cardinal..... 58.5
Metcalf..... 17.0	Prescott..... 68.1
Ormond..... 25.0	Brockville... 80.3
Winchester... 29.0	Lyn Village.... 86.6
Cass Bridge... 32.5	Gananoque.... 113.9
Williamsburg. 41.0	Kingston..... 132.5

Kingston-Toronto.

Miles	Miles
Kingston..... 0.0	Cobourg..... 93.8
Cataraqui.... 3.6	Welcome..... 104.3
Napanee..... 25.5	Newcastle.... 117.0
Maryville.... 33.9	Boumanville... 122.8
Shannonville. 40.6	Oshawa..... 132.2
Belleville.... 49.4	Whitby..... 136.4
Trenton..... 60.7	Pickering.... 142.5
Brighton..... 70.1	Liverpool.... 144.7
Colborne..... 78.4	Riverdale.... 163.2
Grafton..... 86.2	Toronto..... 165.0

Toronto-Buffalo.

Miles	Miles
Toronto..... 0.0	Vineland..... 73.5
Cooksville.... 16.3	Jordan..... 75.3
Erindale..... 19.6	St. Catharines. 82.4
Trafalgar VII. 24.7	Homer..... 85.7
Appleby..... 35.0	St. Davids.... 90.6
Freeman..... 38.8	Stamford..... 92.7
Aldershot.... 41.6	Niagara Falls. 97.5
Hamilton..... 47.0	Echota Station. 101.0
Stony Creek... 53.7	La Salle..... 104.0
Winona..... 59.3	N. Tonawanda. 110.2
Grimsby..... 64.4	Tonawanda.... 110.6
Beamsville... 69.3	Buffalo..... 120.1

Buffalo-Syracuse.

Miles	Miles
Buffalo..... 0.0	Yellow Mills... 94.8
Williamsville. 9.8	Palmyra..... 96.0
Clarence..... 18.1	E. Palmyra.... 100.9
Pembroke..... 26.0	Newark..... 105.5
E. Pembroke.. 32.6	Lyons..... 111.6
Batavia..... 39.2	Lock Berlin... 115.8
Byron..... 49.0	Clyde..... 120.2
Bergen..... 55.6	Savannah.... 126.6
Churchville... 59.0	Montesuma.... 132.0
North Chili... 63.4	Port Byron... 136.6
Rochester..... 73.8	Weedsport.... 140.1
Brighton..... 77.0	Elbridge..... 146.5
Fairport..... 83.8	Camillus..... 153.7
Macedon..... 92.1	Syracuse..... 162.0

Syracuse-Albany.

Miles	Miles
Syracuse..... 0.0	West Schuyler. 53.0
Fayetteville.. 7.6	Ilion..... 63.4
Myecnae..... 12.1	Herkimer..... 66.1
Sullivan..... 16.4	Little Falls.. 73.4
Canastota.... 21.5	St. Johnsville. 83.9
Wampsville... 23.7	Palatine Bridge 92.7
Oneida..... 27.1	Vost's Station. 98.9
Oneida Castle. 28.5	Fonda..... 104.2
Vernon..... 33.7	Albion..... 111.9
Kirkland VII. 42.0	Amsterdam... 114.9
New Hartford. 47.1	Scotia..... 129.0
Utica..... 50.6	Schenectady... 130.6
Deerfield..... 52.0	Albany..... 145.6

**FAWSCO COMBINATION CLEANER.**

J. H. Faw, Inc., New York City, announces the Fawasco improved combination gasoline gauge, oil cock wrench and cleaner, as a tool that is one of the most needed by all owners of Ford cars. The claim is made for this tool that it will not only accurately measure the gasoline in the tank, but provide the only sure means of learning whether there is oil in the crank case, as the pin will prove if the oil cock is stopped up or the oil used up. This tool is made of coppered Bessemer steel rod, nickel plated and black enameled and is guaranteed to give complete satisfaction mechanically and profitably to both user and dealer.

Packed 12 in a heavy corrugated carton, one of them mounted on a display easel; balance in separate envelopes. They are not only attractive to owners and dealers, but jobbers will find them readily sold, easily shipped and quickly reordered.

Manufactured by J. H. Faw, Inc., 41 Warren St., New York City. Retail price, 35 cents.

DOW FLAG HOLDERS.

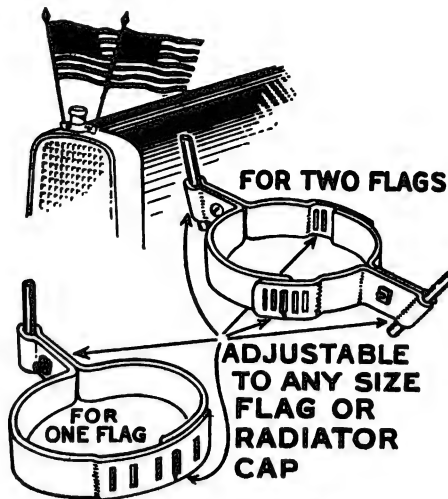
"Be Patriotic" is the slogan of today, and every automobile driver should display the Stars and Stripes on his machine. The Dow flag holders are designed for either one or two flags and an ingenious arrangement makes it possible to adjust them to practically any size flag or radiator cap.

Manufactured by Dow Wire and Iron Works, Inc., Louisville, Ky. Price single holder, 35 cents; or double, 45 cents.

GOODRICH AUTO SWITCH.

The old maxim "It is useless to lock the barn after the horse is stolen," applies today to automobiles, and the wise motorist is careful to apply the "ounce" of prevention by locking his car when he leaves it. The Goodrich auto switch is equipped with a Yale lock and designed for application to the Ford car coil box. When the key is turned the ignition current is automatically cut off. The turning of the key also accomplishes one other thing; two small shutters are automatically turned over so as to cover the screw heads, which fasten the lock to the case, thus making it impossible to remove the lock.

Manufactured by Goodrich-Lenhart Manufacturing Co., Widener Bldg., Philadelphia, Penn. Write for prices and literature.



Dow Flag Holders.



Pocket Screw Driver.



Fawasco Combination Cleaner.



The Holdford Brake.



Goodrich Auto Switch.

THE HOLDFORD BRAKE.

Worn out or inefficient brakes are the causes of many of the serious accidents attributed to "car got beyond control of operator." The Holdford Brake, as the name indicates, is designed primarily for Ford cars and may be used in addition to those on the car, or to take the place of either the service or emergency brakes. This brake is made from the best of materials, the points where the greatest strain comes are drop forgings, and the lining is J. M. Non-Burn. It is so designed as to be efficient under all conditions, bringing full contact with the external surface of the brake drum, after the first adjustment, until the lining is completely worn out. It may be connected to the foot pedal by means of an equalizing bar, thus relieving the transmission of strain and furnishing a positive brake at all times. In using it on the hand lever the internal brake may be left inside the brake drum or thrown away, according to the car owner's pleasure. In applying the brake, no changes in the car are necessary.

Manufactured by the G. H. Dyer Co., Cambridge, Mass. Price per set when applied to hand lever, \$8.50; for application to foot pedal, \$10.

POCKET SCREW DRIVER.

One of the 1500 good tools manufactured by Goodell-Pratt Co. is the little pocket screw driver, which is especially handy around the automobile for the reason that it is always handy in the pocket. The handle is made of steel, nickel plated, so that it will not rust. The chuck may be reversed and fitted into the handle in such a manner that the extreme length of the tool is but 3¼ inches. Complete with three blades and a reamer it weighs but four ounces and is easily carried in the pocket.

Manufactured by the Goodell-Pratt Co., Greenfield, Mass. Price 80 cents.

WILMO MANIFOLD.

How long will the world's supply of gasoline last? is the question that is commanding the attention of scientists



The Wilmo Manifold.

and laymen everywhere. It is said that, based upon present day rate of consumption, the supply will be exhausted in about 27 years. At all events, the ever increasing consumption of gasoline demands conservation.

Interesting tests made by the technical representative of the American Automobile Association show an increased gasoline mileage of from 42% to 54% as a direct result of Wilmo Manifold efficiency. Tests made in Chicago before a body of representative newspaper and magazine men show as high as 59% increased mileage.

This gasoline efficiency is said to be insured by the Wilmo Manifold, a unique device, which attaches to any L head engine, and becomes a permanent part of the engine. It combines the function of both intake and exhaust manifolds. The exhaust gases passing out through the upper chamber heat a dividing wall, which in turn superheats and vaporizes the incoming mixture as it comes in contact with it before entering the combustion chamber.

Now made by the Whittier Company, First National Bank Bldg., Chicago, Ill. Prices range from \$7.50 to \$15, according to make of car.

STEEL BELT LACING.

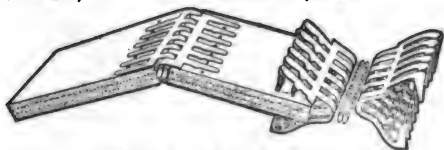
The efficiency of an automobile engine is dependent upon the proper action of the cooling system, and the working of the cooling system is in many cases dependent upon the action of the fan belt. Unless the action is smooth there is a constant vibration, for this part travels very fast. The alligator steel lacing is designed for connecting the ends of belt up to practically any width. Its application is simple. Simply cut off a strip the width of the belt and pound it on to the ends with a hammer, inserting proper length of hinge pin.

Manufactured by Flexible Steel Lacing Co., Clinton St., Chicago, Ill.

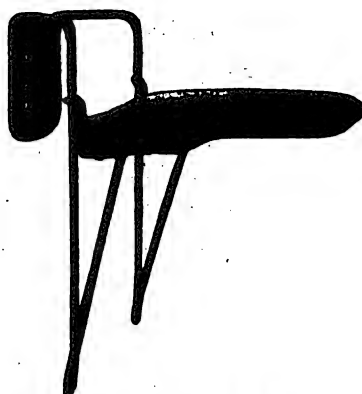
INSYDE TYRES.

The prospect of adding from 1000 to 5000 miles to the life of a casing should interest every motorist. Insyde Tyres have been designed to do just this the manufacturers say. They are made of heavy tough fabric, vulcanized together over tire moulds so that they exactly fit the shoe. The outside is coated with rubber, which eventually vulcanizes itself to the casing and prevents slipping. The inside is treated in such a manner as to prevent it sticking to the tube. It is claimed that by means of an insyde tyre the air pressure strain is removed from the casing, thus leaving it free to carry the weight of the car alone.

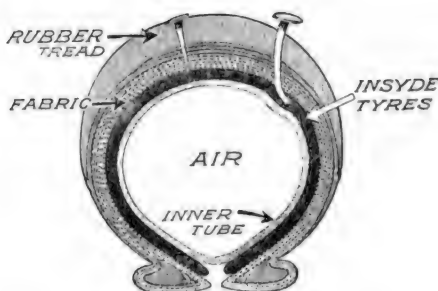
Manufactured by American Automobile Accessories Co., 621 Main St., Cincinnati, O. Prices upon request.



Flexible Steel Lacing.



Buffington Folding Seat.



Insyde Tyre Application.



Raybestos Suits.



Shaler Vulcanizer Carton.

RAYBESTOS SUITS.

In order to further a national advertising campaign the Raybestos company of Bridgeport, Conn., are offering an extremely interesting proposition both to trade interests and automobilists in general. One-piece suits which are guaranteed by the manufacturer to prevent all oil, dirt or grease from soiling the clothes of the wearer are being furnished at cost prices by this concern. These suits are well made of heavy fabric in a choice of three weights at different prices, and have Raybestos advertising name printed across them. For the garageman who sells this product it affords good advertising; for the machine owner, such advertising matter is not objectionable, as he is able to get a good suit at an extremely low price.

For further details and prices write to the Raybestos Co., Bridgeport, Conn.

BUFFINGTON FOLDING SEAT.

By the addition of a Buffington Folding Seat the passenger capacity of a car is increased. These seats are made for attachment to the automobile door and constructed of $\frac{3}{8}$ inch polished basic steel, Japan finished. The seats, which are of three-ply veneer, $\frac{1}{4}$ inch thick, measuring 11 by 11 inches, are upholstered with imitation black leather. The side which comes against the outside of the door is upholstered and the frame that comes in contact with the top of the door is wrapped in the best quality imitation leather to prevent the scratching of the body finish. When not in use the seat may be folded on door or carried on the floor of the car.

Manufactured by C. A. Buffington & Co., Berkshire, N. Y. Write for prices.

SHALER VULCANIZER.

The accompanying illustration shows the unique display carton in which the Shaler five-minute vulcanizer is being supplied to dealers. The cover of the stand provides for a real vulcanizer to be fastened to a section of inner tube, showing both the method of operation and a completed repair. Opposite the vulcanizer is a match, slipped in a little holder. The color scheme and idea are striking and the combination forms an ideal "Silent Salesman" of the Shaler vulcanizer.

Manufactured by C. A. Shaler Company, Waupun, Wis. Write for details.

FOLDING WATER PAIL.

A handy accessory, either for the camper or autoist, is introduced under the name of Duplex water pail, which is made of brown water proofed canvas and so designed as to stand alone when full of water. This is made possible by the reinforcing parts of rust proofed steel, which are so made as to permit the folding up of the pail into a very small compass.

Manufactured by the Planet Co., Westfield, Mass. Prices for six-quart size, \$1; for 10-quart size, \$1.50.

SIMON'S CHIEF SELLERS.

Seven interesting automobile accessories which are designed for making the car comfortable are known as Simon's Chief Sellers. The curtain carrier, which is attached to the back bow of the tonneau, protects the side curtains against breakage, as they are carried rolled instead of folded. Being in the top of the car they are always within instant reach, protected against dust and weather. A handy pocket for books, samples, small tools, etc., may be fastened to the doors of Ford cars with a few tacks. This pocket is made of black fabrikoid to match the upholstery, and is a very attractive fitting. Made of three-ply basswood, enamel covered, fiber bound and riveted with brass lock and bolts to the running board trunk may be attached to either the running board or rear trunk rack and provides a receptacle for holding suit cases, keeping them free from road dust and dirt. A neat and close fitting adjustable hood and radiator cover with front curtain forms a protection against cold in the winter time, and a noticeable saving of fuel. A protection for the lamp against rain and snow, as well as an effectual glare stopper, is provided in the Simon lamp dimmer for Ford cars. This device is designed to buckle under the lamp. A rear window of transparent celluloid, with bound edges and fitted with eyelets and clasps for attaching to replace broken lights.

Manufactured by S. C. Simon & Co., 404-412 Brown St., Philadelphia, Penn. Prices as follows: Curtain Carrier, 75 cents; Window Light, 25 to 60 cents, according to size; Draft Shield, 50 cents; Door Pocket, \$1; Running Board Trunk, from \$8 to \$20, according to size; Adjustable Hoods to fit all cars, write for prices; Lamp Dimmers, 20 cents each. Write for descriptive catalogue of other products.

CENTURY CIGAR LIGHTER.

For the touring motorist there are few accessories quite so convenient as an electric cigar lighter. It makes no difference what speed the car is going or how brisk the wind is, such a device makes the lighting of a cigar an easy matter. The Century cigar lighter is



Century Cigar Lighter.

made to operate on a six-volt storage battery, it is neat in appearance, being finished in black leather with nickel trimmings. It is equipped with seven feet of silk cord, a push switch, and may be attached in a very few minutes.

Manufactured by Mabey's Electric and Manufacturing Co., Indianapolis, Ind. Price complete, \$1.

WATER GAS CARBURETOR.

For a long time engineers have been experimenting with gasoline engines on the line of the introduction of steam into the cylinders. Many of the experiments seemed to indicate that if steam or water and air were injected in the right proportions into the cylinders there was an increase of power, a decrease of fuel consumption and a reduction of carbon deposit. The Water Gas Carburetor outfit is designed to introduce the right amount of water or vapor into the engine. The outfit consists of a nine-pint copper tank with brackets for installation, 10 feet of

copper tubing with fittings and the Water Gas Carburetor. Suction from the intake manifold draws filtered water from the tank into the Water Gas Carburetor (a double jet sight feed set in the instrument board). Controlled automatically to correct speed by an air balanced governor, the water is fed by the carburetor, drop by drop, through the copper tube into a coil wrapped around the hot exhaust pipe. Here it is converted into steam and is sucked into the cylinders through the manifold.

Manufactured by the Water Gas Carburetor Co., Kansas City, Mo., or Fifth avenue, New York.

ROTHWEILER PUMP.

A saving of oil and greater efficiency in handling are two features claimed for the Rothweiler pump. This device consists of a pump which delivers a full quart of oil at each stroke, equipped with a type of spout designed to eliminate dripping, mounted on a long tube which will reach to the bottom of an ordinary oil barrel standing on end. The tube is so arranged as to be telescopic and with this feature can be used in the barrel either from the end or side.

Manufactured by Rothweiler & Co., Broadway, Seattle, Wis. Price upon request.

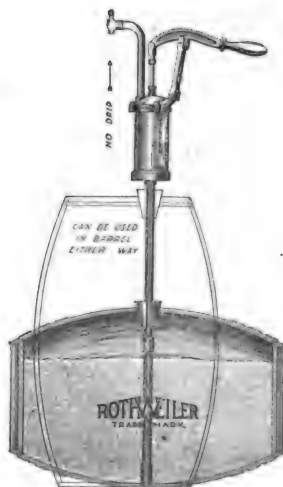
PIPE AND CIGAR LIGHTER.

There is nothing more annoying to the motorist than to be obliged to slow up his car or pull up to the curb in order to light his pipe or cigar. The device shown in the illustration herewith is designed especially for lighting the pipe, or can be used equally well for lighting a cigar or cigarette. When the motorist wishes to light his pipe or cigar he simply reaches for the lighter, takes it from the holder, presses the button and a light is immediately available, wind or weather making no difference to the action. The pipe lighter is equipped with 10 feet of cord and designed for connection with the storage battery. The cord is automatically reeled up when not in use upon a special winder by spring tension.

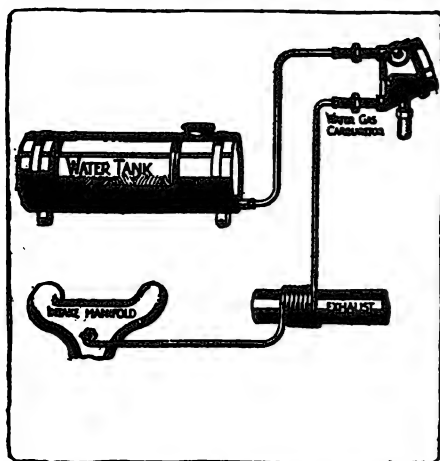
Manufactured by the Metal Specialties Mfg. Co., 732 West Monroe St., Chicago, Ill. Price complete with winder, \$4. Without winder, \$1.50.



Pipe and Cigar Lighter.



Rothweiler Pump.



Water Gas Carburetor Outfit.



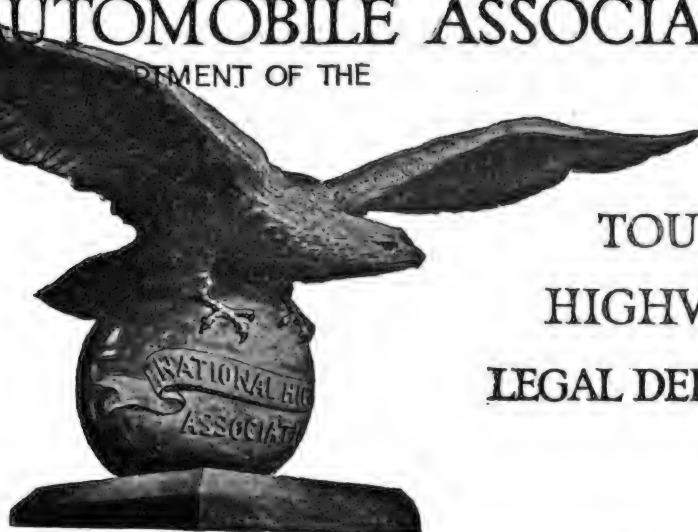
Simon's Chief Sellers.

OFFICIAL JOURNAL OF THE NATIONAL AUTOMOBILE ASSOCIATION

DEPARTMENT OF THE

NATIONAL
HIGHWAYS
ASSOCIATION

TOURING
HIGHWAY
LEGAL DEPTS.



9 PARK STREET, BOSTON, MASSACHUSETTS

New Traffic Laws in New York State

THE Welsh Traffic Bill, so-called, driving for the uniform regulation of vehicles, animals and pedestrians on any public highway in the State of New York, was approved by the Governor on May 24, and is now the law of the state, being chapter 655 on laws of 1917.

Besides defining highways, streets, curbs, crossings, street intersections, vehicles, motor vehicles, motorcycles, horses, drivers, pedestrians, one-way driving, parkways, spaces, reckless driving and safety zones, it contains several interesting features which would be well for motorists to recollect and to govern themselves accordingly.

What Motorists Shall Do: The Do's Are:

1. Vehicles in driving into another street shall keep as near the right hand curve as practicable.

2. Vehicles turning to the left into another street shall pass to the right of and beyond the centre of the intersecting streets, unless otherwise directed by a traffic officer.

3. A vehicle passing around a circle shall keep to the right of the entrance from exit.

4. Vehicles turning around or crossing from one side of the street to another, shall do so by turning to the left so as to head in the general direction of driving after they have crossed the street.

5. Vehicles shall not pass or approach within seven feet of a street car when it has stopped to receive or discharge passengers.

6. Vehicles shall keep to the right of highways divided longitudinally by a park way, walk, space for street cars, viaduct, safety zones, etc.

7. Vehicles of the United States mail, police or fire patrol, bureau of buildings, emergency repair of public service corporations, ambulances and the military shall have the right of way, when in a performance of duty.

8. Vehicles shall not be driven through processions except by police orders.

9. Two vehicles passing each other in opposite directions shall have the right of

way and except in cities or villages no other vehicles to the rear of either of such two vehicles shall not pass or attempt to pass such two vehicles while they are passing each other.

10. Drivers of vehicles approaching street intersections shall grant the right of way at such intersections to any vehicles approaching to his right.

11. Vehicles having the middle right of highways on their left shall have the right of way.

12. Driver of overtaking vehicle shall signal his desire to pass any overtaken vehicle by signaling and shall pass on the left.

13. Persons shall not drive vehicles within safety zones.

14. Motor muffler cutouts are prohibited within the limits of cities or any incorporated villages.

15. Gongs and silent whistles are generally prohibited.

16. Before turning to the right or left drivers of vehicles shall warn those following by arm signals.

17. Reckless driving is prohibited under heavy penalties.

VERMONT AUTOMOBILE LAWS.

On account of the many changes in the statutes regarding automobiles and vehicles, a brief synopsis of the laws passed at the last session of the Legislature is given herewith:

1. Do not open muffler cut out in city, village or thickly settled part of town. Penalty, fine not over \$100.

2. When auto or motorcycle is operated or at rest on a highway, from 45 minutes after sunset to 45 minutes before sunrise, lamps complying with the law must be lighted. Penalty, fine not over \$100.

3. When an accident occurs, stop, render such assistance as you can, give your name, address and license number. Report facts to Secretary of State within 24 hours. Penalty, fine not over \$500, imprisonment not over two years, or both.

4. When you meet a frightened horse, stop, until the horse gets by, or the driver

tells you to proceed. Penalty, fine not over \$100.

The following applies to both autos and teams:

5. Meeting, keep to the right of centre of highway so as to pass without interference at not over 20 miles an hour. Penalty, fine not over \$50.

6. Right of way. Give right of way at intersecting highways to all vehicles approaching from the right. You have the right of way over those approaching from the left. Penalty, fine not over \$50.

7. Intersecting highways. Approach slowly. In turning to right, keep to right. In turning to left, slow down and pass to the right of centre. Penalty, fine not over \$50.

8. Overtaking. Pass to left, but not to left of centre unless clear ahead. On signal from following car, turn to right and allow the car to pass. This applies to all teams. Penalty, fine not over \$50.

9. Do not pass a vehicle at the top of a hill, on a curve or at intersecting highways, where view is obstructed. Penalty, fine not over \$50.

Stops When Street Cars Are Discharging.
10. Stop five feet from a street car discharging passengers. Penalty, fine not over \$50.

11. Where traffic is heavy, all slow moving vehicles, teams included, keep at all times as close to right of road as practicable. Penalty, fine not over \$50.

12. Drive carefully around corners, keeping as far to right as practicable. Penalty, fine not over \$50.

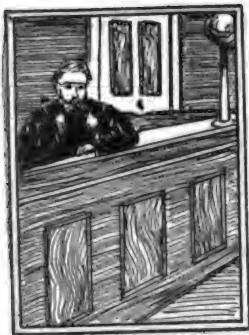
13. On divided streets and circular drives, enter and leave to the right. Penalty, fine not over \$50.

14. Do not turn without care. Do not back car further than necessary. Both on highways. Penalty, fine not over \$50.

15. Do not drive on highways where sign or barrier indicates it is closed. Penalty, fine not over \$50.

Teams Only.

16. All vehicles, except farm machinery and vehicles for transporting hay, straw, wood, lumber, stone, machinery, or heavy freight, carry a light showing front and rear from 45 minutes after sunset to 45 minutes before sunrise. Penalty, fine not over \$5.



Colored Headlights Ban in Massachusetts the Law In the Majority of States

By FRANCIS HURTUBIS, JR.



SO MANY motorists have been carrying colored glass in motor headlights that a ruling upon the question has recently been handed down by the Massachusetts Highway Commission. In substance this decision states that the use of such glass is not in accordance with law unless there are other headlights showing on the front of the machine. The law requires two forward white lights. If a car has side lights with white glass and these are kept burning, colored glass may be used in the headlights, providing it does not shut off too much light. But where both the sets of forward lamps are within the headlights and behind the colored glass its use is illegal.

Many owners of motor vehicles in endeavoring to comply with the anti-glaring headlight rule have adopted the colored glass method of meeting its requirements. Generally speaking, where state laws require two forward white lights, and this is practically the law of the majority of states, this interpretation of the rule would seem to be applicable.

HORN SIGNALS BLOCKED.

It is with regret that the Massachusetts Legislature has seen fit to reject the petition of the National Automobile

Association intended to lessen the abuse and misuse of automobile horns signaling. Under the laws of Massachusetts not only is a motorist obliged to slow down at intersecting streets, but he is also obliged to give a timely signal of his bell or horn or other means of signaling; the result is a bedlam of noises. It is hoped that before many more legislative sessions have come and gone that the sensible suggestions of a writer in the recent number of the National Municipal Review relative to the subject may find lodgment in the minds of our solons.

"Each motorist feels," says the writer on progress of the anti-noise movement, "that he is entitled as much as anyone else to a clear path, so he sounds the sharp blasts of his horn to announce his coming and to warn all persons to get out of the way. When he wishes to attain high speed, whether within legal limits or not, he finds the auto horn gives him the privilege. While the law may specify that the motorist must slow up at crossings, yet he finds that he can easily disregard such regulations if his horn is in good order. Nearly all cities forbid all kinds of unnecessary noises, but few people think of the illegal part of auto horn blowing. We invite a friend

to take an automobile ride with us and use a dozen blasts of the horn to announce our arrival, without considering that the entire neighborhood is being disturbed."

NEW HAMPSHIRE LAWS.

Under the provisions of law recently enacted by the New Hampshire Legislature, local examiners, who are appointed by the Highway Commissioner of the state, are given police powers with respect to the enforcement of the motor vehicle law only, but with state wide jurisdiction. The commissioners may make arrests for violations of the law and have power to serve criminal process and require aid in the execution of their official duties.

Another new law relates to headlights. It provides that all motor vehicles equipped with electric headlights shall also be equipped with some device, to dim the glare or to scatter the rays of light from the same, which shall have been approved by the commissioner of motor vehicles, and it shall be the duty of any person having control or charge of a motor vehicle, which is equipped with electric headlights, to dim or extinguish such headlights when approaching an electric street railway car or another automobile.

Police Activities in New England

WOONSOCKET, R. I.—The police in civilian's clothes are operating traps in different parts of the city to catch motorists for overspeeding. We should suggest your driving at a moderate rate of speed through this city.

BRADFORD, CONN.—A warning to motorists has been issued in this town not to pass trolley cars which have stopped for the purpose of permitting passengers to board or to alight. The police are contemplating stopping all violations of the speed laws.

STAMFORD, CONN.—The police of this city have begun a campaign against all fast and reckless driving of motor vehicles. Officers are mounted on motorcycles.

NEW HAVEN, CONN.—On Dixwell avenue, Hamden, the state police are operating a trap for overspeeders.

The New Haven police have also started an active campaign against all violations of the motor vehicle laws. There is also a trap on Grant avenue.

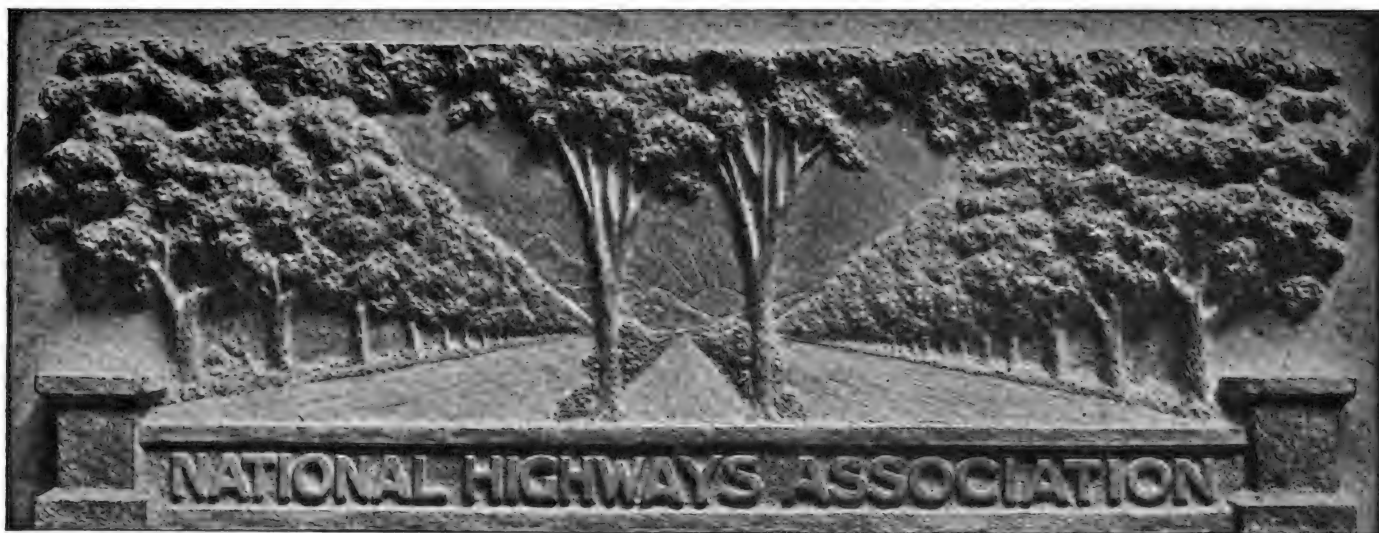


NAHANT, MASS.—On Boulevard, between Lynn and Nahant, motorists are being stopped by officers for traveling over 20 miles an hour.

WAYLAND, MASS.—A trap is being operated between Wayland and Weston.

QUINCY, MASS.—The police of this city have been instructed to strictly enforce the traffic and motor vehicle laws. Motorists traveling through the city are expected not to exceed 15 miles an hour and in places less.

PORTLAND, ME., AND VICINITY.—Owing to the fast and frequently reckless driving of motor vehicles between Portland and Kittery and from Portland to Brunswick, a considerable agitation has arisen to place these highways under motor patrols, and as in the near future some such step may be taken, we warn motorists to have more regard for the motor vehicle laws than has apparently heretofore prevailed.



Highway Conditions in Massachusetts

WE HAVE just received the following report from the Chairman of the Highway Commissioners on the condition of highways in Massachusetts in regard to the condition of state highways in Massachusetts.

As a whole the roads are probably in better condition, in spite of the wet weather which delayed the repairs, than they have been in any year in the past.

The main line east and west via Fitchburg, Greenfield, the Mohawk Trail, North Adams, to Williamstown, is at present in very fair condition.

There is a detour, plainly marked, over a reasonably good country road where construction is going on, in Ayer. The rest of the road is in good condition, except where some resurfacing is being done in Erving, and that is kept in passable condition.

The road over Shelburne mountain is being shaped up and kept in good condition for a dirt road.

The same is true of the road in Charlemont. Some construction is going on, but the contractor is keeping the road in very passable condition.

The Mohawk Trail, which is only a graded dirt road, is kept constantly shaped and is in good order for anyone to go over, except after three or four days of heavy rain, when it will be in good order again by the following day. Even in the rain it would be passable with chains on, although somewhat rutted to travel over it.

The road north from North Adams through Clarksburg and so on to Vermont is in good order.

The road from Williamstown north to Pownal, Vt., is under construction, quite rough, but kept so it is possible to go through.

The best road to Keene, N. H., in Massachusetts, is via West Fitchburg and Winchendon, where there is a good gravel road, to Fitzwilliam and the New Hampshire line.

The road from Littleton to Groton and

so on through Townsend and Ashby is partly under construction, but only a gravel road is being built, so it is reasonably passable.

The road from Greenfield north via Northfield or Bernardston is all in good order.

While there is some resurfacing going on between Boston and Worcester, the road is going to be at all times passable, though sometimes motorists may have to go in single file.

The road from Worcester to Fitchburg is only to have a little widening and slight resurfacing going on on the corners.

The same is true on the road from Fitchburg over Jacobs Ladder to Lee and Stockbridge, or via Lenox and Pittsfield.

The road from Pittsfield to Albany is in very fair order.

The interior route from Northampton to Pittsfield via Goshen and Dalton is under construction, and while it is passable to go through, would not be a very pleasant trip.

The road from Bonnyrigg Four Corners in Becket, up through Washington, is in good order as far as Washington, and a fair country road via Hinsdale to Dalton. There is construction going on on a new road there which need not be followed.

The road from North Adams and Williamstown south to Pittsfield; our state highway via Adams is all in good condition. The road from Williamstown to South Williamstown will have some construction going on, but will be passable.

From Pittsfield south to New York and Connecticut points, there is construction going on between Stockbridge and Great Barrington over Monument Mountain, but the detour to the state line is a very fair country road.

There is construction going on in Sheffield on the middle road. This should be avoided, but there are detour signs directing people to go back onto the new

gravel road which has been built, taking the easterly road via the river. From here on the road is in good condition to the Connecticut line.

The main road in the central part of the state from Fitchburg, Worcester and so to Providence, is in good order from the New Hampshire line as far as Worcester, but from Worcester south through Grafton there is construction going on in Northbridge and Uxbridge, with rather poor country road detours, passable but uncomfortable. It is probable that a better route would be to go via Sutton and Millbury, though there is some construction going on on the roads there.

The road from Uxbridge to Providence is all in good condition.

On the road from Boston to Providence there is some slight resurfacing going on, but the road as a whole is in better condition than any year heretofore.

The road via Taunton, from Boston to New Bedford, has some construction going on between Taunton and New Bedford, but it is going to be kept open and passable.

Later in the summer there may be some construction on the main line going to Taunton, in the town of Easton, in which case there will be a detour to the west, plainly marked, or people can go via Brockton and Middleboro and so on down to Fairhaven and New Bedford.

There is construction in Fairhaven and Acushnet where a road is being built, but there is a detour to the east.

The road from Providence via Fall River, New Bedford, and so on to Cape points at Wareham, would have some construction going on, but would be kept open. The travel would have to follow the car tracks in Mattapoisett, where a concrete road is going to be built.

The road to the cape via Randolph, Brockton, Bridgewater, Middleboro and so on down to Wareham, is in much better condition than usual.

The roads on the cape, both on the north and south sides, and to Falmouth, are in better condition this year than heretofore. While there is some widening and resurfacing going on they will be kept open to travel.

On the inside line from Boston to Plymouth via Hanover Four Corners, construction will be going on in Hanover, with a reasonably good detour, and construction will be going on until about Aug. 1 in Kingston.

The road from Boston to Plymouth via Scituate and the shore is all in good condition and will be kept open; and the same is true of the road from Plymouth to Sagamore and so on down the cape.

The road on both the north and south sides of the cape is in much better order than it has ever been before, and it is going to be kept open, though there is going to be some work done in the way of widening and improving corners.

On the roads north from Boston; to Lowell, construction will be going on in Billerica on the route that goes via Winchester and so on to Lowell.

The road from Lowell to the White Mountains via Tyngsboro is all in good order and will have very little done on it this season except maintenance.

The road from Boston to Lowell via Woburn and Tewksbury will have some resurfacing going on, but will be kept open for travel.

The road to Lawrence via Reading will have some resurfacing going on for about two months, but there will be a detour plainly marked over a reasonably good country road.

The road from Andover to North Andover and so on to Haverhill is all in good condition.

The road to the North Shore via Lynn is in better order than any time heretofore, either by the Metropolitan Parkway or over the Lynn marshes.

The road from Beverly to Gloucester and Cape Ann is all in good condition. There is some construction going on on the road back from Gloucester to Essex and Ipswich, but while travel has to go in single file, it will be kept passable and work ought to be finished by July 15.

The road north to Newburyport and so on to the New Hampshire line is all in good condition. There will be nothing but a little widening going on.

The Newburyport Turnpike is in good condition for a heavily traveled country road. It is kept constantly maintained. Probably there will be some construction for a mile and a half in Melrose, Malden and Saugus, in which case the detours will be marked.

The road from Salem to Lawrence via Middleton is now in much better condition than heretofore. It is probable that there will be some construction on that main line in the town of Danvers, in which case detours will be marked via Maple street, Danvers. There will be some construction on the Danvers end of the road near the asylum, but the road will be kept open for travel.

The road from Lowell via Lawrence, Haverhill, and so on to the Massachusetts and New Hampshire beaches and

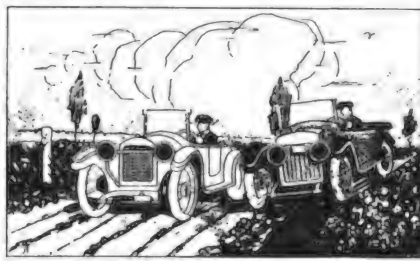
main points, is in better condition than it has ever been. Going out of Lowell it will be necessary to follow the car tracks on First street, though there will be a new road built probably this summer along the river to continue the boulevard.

The road on the south side of the Merrimac river crossing the Groveland bridge and so on to Newburyport is all in good condition.

The road from Salisbury Center to Salisbury Beach and so on by the beach and to the New Hampshire state line, is all in good condition, and will have no work going on on it except slight resurfacing and widening.

A Word to Road Hogs

WITH the arrival of good weather and good roads and the touring season, may we suggest a note of warning to motorists who come within the above named class, that the highways are built for the use of all the people and that no motorist has a right to usurp these highways to his own individual use. The rule of law is that users of the highways have equal and reciprocal rights and the law of decent living morally demands the conduct required by law.



SPRINGFIELD COURTESY.

The Springfield Union of Massachusetts has just offered some succinct and sensible suggestions relative to the handling of motor vehicle drivers, which we deem worthy of offering in our columns. While the suggestions relate directly to Springfield they are pertinent to almost any locality.

It says that while it is right and proper that automobilists should be compelled to drive carefully and keep a sharp lookout for pedestrians, it does not follow that the pedestrian is absolved from the exercise of due care. Altogether too many persons cross a street without apparently giving any heed to their own safety. They court danger unnecessarily when they look neither to the right nor to the left and proceed on their way in blissful confidence that all vehicles in some way will manage to dodge them. It is a poor rule that doesn't work both ways, and if automobilists are to be held strictly to account pedestrians should be equally obligated to look and listen.

In their enforcement of the new law

the police have assumed that the public has had ample opportunity to understand its provisions, and hence no further warning is required. This is probably true to a large extent, but we urge the police not to be too severe on automobile drivers from out of town. So numerous and widely different are automobile laws and regulations that it is difficult for even the most careful and best intentioned driver to conduct himself in a manner to avoid trouble.

We do not ask the police to wink at violations of the law, on the contrary, we look to them to enforce the law. We merely suggest that they show good judgment and accord the stranger the same courtesy and consideration that law abiding Springfield people expect to receive in visiting other cities. We do not want Springfield to get into the class with Northampton, which has achieved unenviable distinction because of the officiousness of its police in enforcing the automobile regulations.

CONNECTICUT HIGHWAYS.

NEW HAVEN, CONN.—Considerable paving will be done in this city in the near future. At the present time work has been begun from Forbes avenue from Tomlinson bridge to Grannals corners. No paving will be put in East Chapel street and also in Ferry street.

RHODE ISLAND HIGHWAYS.

WICKFORD-HAMILTON.—Road construction is being done between these two towns for a distance of about two miles. A detour is well marked. It is expected that this road work will be completed about the middle of July.

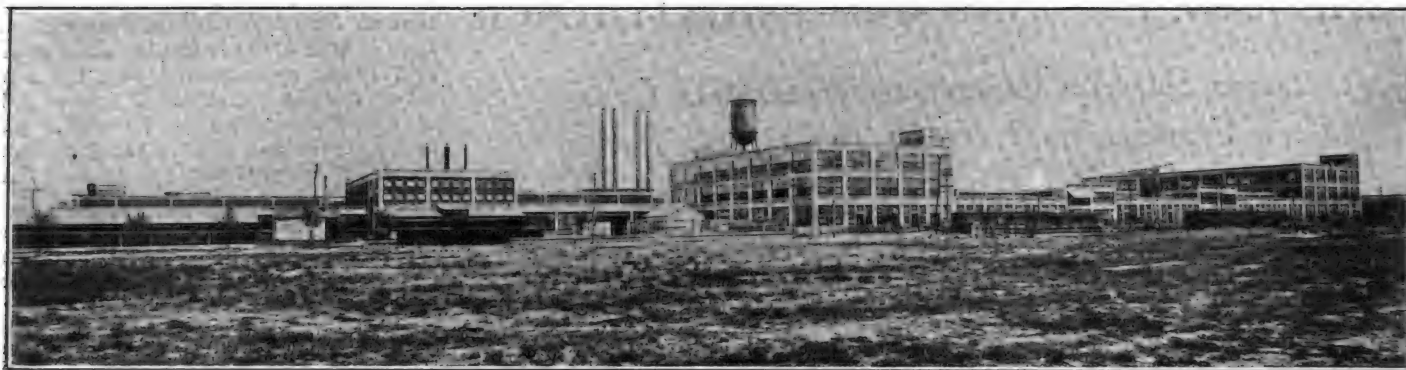
WAKEFIELD.—A little over a mile of highway construction is being done upon the main road between Wakefield and Narragansett Pier, which is expected to be completed early in July. A detour is plainly marked.

NEW CONNECTICUT LAW.

The new motor vehicle traffic law which has just gone into operation in Connecticut is destined to prove not only a vexatious one, but also unprofitable. It is thought to be doubtful if its literal enforcement is within humane capability. It is also thought that many of its features will never be enforced and that in a large degree this act of the General Assembly of 1917 is "a waste of time, words and the paper upon which it shall be printed." We suggest to our members and to readers of this Journal generally that it will be well not to submit too placidly to charges or complaints of alleged violations of some of the provisions of this law.

MONTREAL-OTTOWA ROAD.

The Department of Public Highways of Ontario reports to us that the road between Montreal and Ottawa for the first 16 miles from Montreal, on the north shore, is a macadam road in fairly good condition, but that the balance of the road to Ottawa is not to be recommended for traveling in wet weather.



New Storage Battery Plant of the Prest-O-Lite Co., Inc., Indianapolis, Ind., Which Will Turn Out More Than Half Million Prest-O-Lite Batteries Per Year.

The Business Side of the Motor Vehicle Industry

The Prest-O-Lite Co., Inc., Indianapolis, Ind., has erected two new additions recently to its plant of three stories each and connected with the old structure at the west and east ends. The west building is 100 feet wide by 160 feet in length, providing a floor space of 48,000 feet, and the east building is 100 feet wide and 200 feet in length, giving a floor area of 60,000 square feet. New machinery and equipment is being installed in the new wings of the plant, which, when in operation, will make possible an immediate increase in production of 50 per cent. in the output of Prest-O-Lite storage batteries, or 1800 batteries a day, at the rate of half a million batteries annually.

These batteries will be handled through the nation wide battery service that the company is now establishing with 33 direct factory branches and more than 600 officially appointed battery service stations.

George H. Houston has been elected president of the Simplex Automobile Co., a subsidiary of the Wright-Martin Aircraft Corporation. He succeeds Edward

M. Hagar. C. B. Hubbard was elected vice president, succeeding M. M. Metcalf. H. M. Crane was re-elected as the other vice president and W. J. Nixon as secretary-treasurer. The directorate is composed of the board of officers and the following: F. V. Adams, C. S. Jennison, T. F. Manville, Glen Martin, Leonard Weston, C. E. Davis and Robert E. Graham.

N. A. Wolcott has been elected president of the Packard Electric Co., Warren, O. For the past 14 years he has held the position of treasurer with the company. Other officers elected were: Vice president, Charles Fillius; secretary, R. E. Gorton. Mr. Wolcott will continue to act as treasurer.

The Locomobile Co. of America, Bridgeport, Conn., has made a number of changes in its sales and service staff. P. W. Hine, manager of the Bridgeport branch, has been appointed assistant sales manager. He will be succeeded by M. A. Pollock, who will be assisted by F. C. Bancroft, formerly in the service department of the company in New York City.

Clinton B. Amorous, assistant general manager, has resigned to become assistant factory manager of the Parish Mfg. Co., Detroit.

W. E. Bertsch has been appointed publicity director of the Elgin Motor Car Corp., Chicago, Ill.

Philip B. Gale, general manager of the Hartford Machine Screw Co., has been elected president of the Standard Screw Co., Hartford, Conn. He succeeds W. B. Pearson, who recently died in Chicago.

William J. La Casse has been appointed supervisor of the Pacific coast territory, comprising nine states, by the Maxwell Motor Sales Corp., Detroit, Mich. He will make his headquarters at San Francisco.

L. W. Swords, formerly factory representative for the Maxwell Motor Company and widely known automobile distributor, has been appointed general field sales supervisor of the Wallace C. Hood Service Bureau of Detroit. He has also been elected a director and stockholder of the bureau, assuming the position of vice president.

The Stutz Motor Car Co. of America, Inc., New York City, which controls the Stutz Motor Car Co. of Indianapolis, has declared a quarterly dividend of \$1.25 a share, payable July 2.

Horace De Lisser, chairman of the board of directors of the Ajax Rubber Co., proposed to Chairman Simmons of the Finance Committee of the U. S. Senate, that a general levy of one-half of one per cent. of the gross sales made by every business in the country and to include fees and other emoluments received by professional men, be made as a means of raising the necessary \$1,000,000,000 instead of the complex and intricate method of taxation now being considered.

The A. B. C. Starter Co., Detroit, Mich., has been advancing its sales and production department steadily, with a record month achieved in May. The sales and production for the past 14 months has been under the direction of Theodore C. Drews, who was formerly with the Ford Motor Co. and later traffic manager for the Hupmobile.



L. W. Swords, Vice President Wallace C. Hood Service Bureau, Detroit, Mich.



Theodore F. Drews, Assistant Manager of the A. B. C. Starter Co., Detroit, Mich.

CHEVROLET WINS CINCINNATI RACE

**Covers 250-Mile International Sweepstake Course
in a Frontenac in 2:26, 47:90 Chipping Record**

LOUIS CHEVROLET, driving a Frontenac, won the 250-mile International Sweepstakes on Sharonville track at Cincinnati on May 30. He covered the distance in 2:26:47.90, or at the rate of 102.18 miles per hour, slightly under the record time made by Gil Anderson in a Stutz at Sheepshead Bay.

Ira Vail, driving a Hudson, came in



Louis Chevrolet, the Winner, Under Front of His Car, No. 1, at Start of Big Decoration Day Race.

second, and Gaston Chevrolet, the winner's brother, was third across the tape. All three finished about a minute apart, but Milton, the fourth driver in at the finish, was over four minutes behind Gaston Chevrolet.

There were 28 starters and 11 finished. The official time of those completing the race given in the order in which they finished follows:

Driver	Car	Time	M.P.H.
Chev'let	Frontenac	2:26:47.90	102.18
Vail	Hudson	2:27:57.44	101.38
Chev'let	Frontenac	2:28:45.73	100.08
Milton	Duesenberg	2:32:47.55	98.1
Hearne	Duesenberg	2:34:17.36	97.2
Cooper	Stutz	2:34:28.47	97.1
Pat'son	Hudson	2:35:48.05	96.2
Henning	Ogren	2:35:49.66	96.2
Mulford	Hudson	2:38:05.05	94.9
Toft	Omar	2:39:28.92	94.1
Oldfield	Oldfield-Delage	2:39:51.65	93.8

J. H. Stewart of Cincinnati won the Ford invitation event of 20 miles with a Ford car equipped with a 16-valve engine. The second event for the Cincinnati Enquirer trophy, a non-stock race of 30 miles, was won by J. Rothart in a Hudson.

STANLEY MOTOR CARRIAGE COMPANY REORGANIZED.

The Stanley Motor Carriage Co., organized under the laws of Delaware with a capitalization, including \$2,500,000 preferred stock and 100,000 shares of common of no par value, has taken over the Stanley Motor Carriage Co. of Newton, Mass., which is one of the oldest automobile manufacturing concerns in the country and the first to produce machines in quantities.



It is understood that the present plant will be expanded to increase the production of Stanley steamers, but that no change will be made in the type of the model which burns either gasoline, kerosene or a mixture of both as fuel. The new financial interests in the company are represented by the banking house of Counselman & Co. of Chicago. Prescott Warren, who has been vice president of the company, is president of the new company and Carleton F. Stanley vice president. The other officers are: Vice president, Frank Jay; treasurer, Edward M. Hallet; secretary, W. F. Garcelon. The officers and the following constitute the directorate: Charles Counselman and Arthur L. Goodwillie.

AUTO PARTS CO. NOW APCO MANUFACTURING CO.

The Auto Parts Co., Providence, R. I., owing to the need of increased facilities

and larger capitalization, was reorganized on June 1 as the Apco Manufacturing Co. with \$200,000 capital, an increase of \$170,000, as compared with the capital of the old company. The large line of APCO specialties for Ford cars will be continued and greatly enlarged facilities will be provided for doubling the present production.

Thomas F. Wilson, the president and treasurer of the company, started the business in an office building eight years ago. At present it occupies a modern fireproof building and has already outgrown this space as a result of the increasing demand for Apco products. It is planned to erect an additional story, increasing the floor space 50 per cent.

It is announced that the policy of the company will be to confine its sales to legitimate jobbers only, and, while a large amount of advertising to the dealer and owner is planned, the business will all be handled through the jobbers.

PERMALIFE BATTERY PLAN.

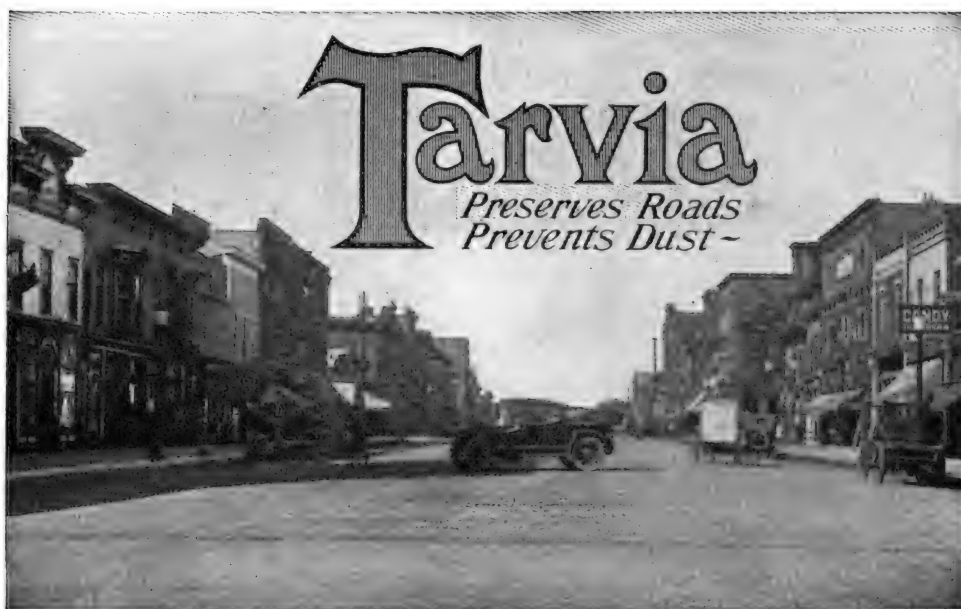
The consolidation of the Permalite Corporation of Indianapolis, and the W. L. Battery Co. of Poughkeepsie, N. Y., has just been completed. The company will be known as the Permalife Storage Battery Co., Inc., and will have offices both in Poughkeepsie, where the batteries will now be manufactured, and at Indianapolis.

The company is establishing depots in all parts of the country for the exchange of their batteries under their rather unique distribution plan, which permits a Permalife user to exchange his battery as often as necessary, for life, for a perfect, fully charged one, at a standardized fee, which amounts to about the same as a charge, and it was for the purpose of handling their steadily growing business that the factory of the W. L. Battery Co. at Poughkeepsie was secured.

This large, modern plant will afford ample facilities for the manufacture of storage batteries, which will be under the supervision of Mr. W. L. Wright, formerly with the W. L. Battery Co., and a pioneer in the battery manufacturing business.



Home of Apco Products, Thomas F. Wilson, President and Treasurer, Providence, R. I.



*Mitchell Street, Cadillac, Mich.
Treated with "Tarvia-A" in 1914*

Well Satisfied with Tarvia—

WE don't have to write advertisements for Tarvia—other people seem glad to do it for us. For instance, the following, quoted complete and unaltered from a recent issue of "MICHIGAN ROADS":

"Figures compiled by City Manager Stephens on the cost of treating the streets of the city of Cadillac with Tarvia show that a total of 33,430 square yards of street surface have been treated with the dust-laying, road-binding preparation this summer at a cost of 2.4 cents per square yard.

"Portions of eight streets have been treated with the well-known preparation this summer. Granite street was given a single application over the entire street and two treatments on a part of its surface. Poplar street was given two complete treatments, while portions of East Division, Delmar, Chapin, Stimson, Lake and Whaley received applications of Tarvia.

"The City Manager's figures show that .313 gallon was required to treat one square yard and that the labor cost per square yard amounted to $\frac{80}{100}$ of a cent, this amount including the sweep-

ing of the street, the application of the Tarvia and the covering of the street with sand.

"The city is well pleased thus far with our experience with Tarvia," says Mr. Stephens, "and the cost has been kept down to the minimum.

"Second applications will be given all of the streets and it is probable that one or two more streets will receive first applications.

"It is necessary that a street be hard and settled before the "Tarvia-A" can be economically applied and several of the streets being repaired this summer will be ready for Tarvia early next spring.

"Residents of streets on which Tarvia has been applied appear to be well satisfied with the results."

Illustrated booklet on request. Address nearest office.

Special Service Department

This company has a corps of trained engineers and chemists who have given years of study to modern road problems.

The advice of these men may be had for the

asking by any one interested.

If you will write to the nearest office regarding road problems and conditions in your vicinity, the matter will have prompt attention.

The *Barnett* Company



New York Chicago Philadelphia Boston St. Louis Cleveland Cincinnati Pittsburgh
Detroit Birmingham Kansas City Minneapolis Nashville Salt Lake City Seattle Peoria
THE PATERSON MFG. CO., Limited Montreal Toronto Winnipeg Vancouver St. John, N. B. Halifax, N. S. Sydney, N. S.

(When Writing to Advertisers, Please Mention The Automobile Journal.)

NEW AMSTERDAM HOTEL



Entrance to Ladies' Reception and Dining Rooms.



One of the Inviting Private Dining Rooms.

AT THE END OF MILLIONAIRES' ROW AND WITHIN WALKING DISTANCE OF THE BIG STORES
EUCLID AVENUE, AT TWENTY SECOND STREET

CLEVELAND,
OHIO

IS THE MOST
CONVENIENT AND
HOMELIKE
HOTEL
IN CLEVELAND
FOR YOU



CLEVELAND,
OHIO

350

FIRE PROOF
ROOMS, WITH
BATH, \$1.50 A DAY
PER PERSON



The New Amsterdam Hotel.



Section of Sitting Room, Where Comfort and Ease
Are the First Objects.



Office and Lobby from Front Entrance, That Is Pleas-
ing and Attractive to Visitors.

(When Writing to Advertisers, Please Mention The Automobile Journal.)



More Light at Night—*Next Fall*

Plenty of light *tonight* isn't enough to ask of a windshield spotlight.

Any spotlight will chase night gloom and shadows—*when it is new*.

The right spotlight is chosen for the satisfaction it will give you a few months after.

C-S GIANT SEARCHLIGHT

Here's *more light* than any other windshield spotlight will give you—dependable light—unfading light.

Tonight, a sunbright flood of radiance—*next fall*, the same unwavering flood of light.

More light, because the best non-corroding materials forbid even a gradual dimming of a Giant Searchlight reflector. *More light* with a permanent, perfect focus—on and off as you wish.

More light to spot the bad places your law-dimmed headlights miss—*more light* to pick up gutters, street signs and house numbers—a trouble light for any emergency.

More light because every C-S refinement and improvement in spotlight construction is worked out in the best materials—with New England care.

Most Hardware Dealers, Accessory Dealers and Garages sell C-S Giant Searchlights. If yours doesn't, write us direct and we will gladly help you get one.

Culver-Stearns Mfg. Company

Detroit, Michigan

Worcester, Massachusetts

Sales Agents: J. H. Faw, Inc., Atlanta, Ga., and New York; M. A. Bryte, San Francisco; Brown and Caine, Chicago; Manuel Bergman, N.Y.

MANUFACTURERS OF ELECTRIC LIGHTING
SPECIALTIES FOR AUTOMOBILES

Practice Sensible Economy

It is your privilege and pleasure to teach and practice economy. To show where efficiency can be increased is doing something worth while and you will do the greatest good for yourself, for he who serves best profits the most.

RAYFIELD

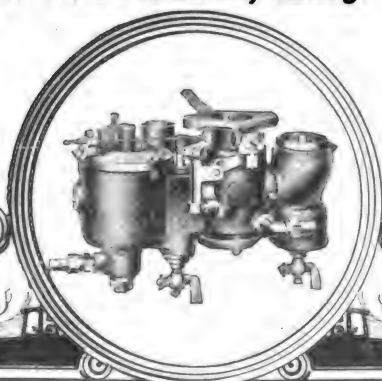
CARBURETORS

occupy a place of distinction that is vastly emphasized at the present time. Greater than its matchless records on Speedway, Highway and Airway, are its proved records in

GREATER ECONOMY HIGHER EFFICIENCY

A thousand Rayfield Sales and Service Stations in America are prepared to install Rayfields and give you 30 days to determine whether they meet your expectations. First and foremost, is its ability to save fuel—to give greater mileage without sacrificing efficiency.

Findeisen & Kropf Manufacturing Company
2127 Rockwell Street, Chicago



(When Writing to Advertisers, Please Mention The Automobile Journal.)



Jackson

NO HILL TOO STEEP
NO SAND TOO DEEP

FREQUENTLY buyers are compelled to sacrifice one virtue in a motor car in order to secure another. But in the famous "Wolverine Eight" you get everything—power, speed, strength, ease of riding, economy and beauty.

The Ferro-Jackson Eight cylinder motor gives power, flexible, smooth-flowing power, that will speed you up to a mile a minute or better. This is the first valve-in-the-head Eight. It is a marvel of accessibility and simplicity. Owners average 17.7 miles to the gallon of gasoline.

Full elliptic springs, front and rear, secure remarkable ease of riding. No car at any price is easier riding; perhaps only one other car equals it. We emphasize this feature and you will appreciate why we emphasize it if you will ask the Jackson dealer to give you a demonstration.

Write for the handsome new catalog printed in three colors

Five Models

Five-Passenger Touring Car	\$1395
Two-Passenger Roadster	\$1395
Four Passenger Cruiser, including five wire wheels	\$1425
(Wood wheels \$100 less)	
Five-Passenger Sedan (Demountable Top) including regular top	\$1605
Seven-Passenger Springfield Sedan	\$2095
All prices f. o. b. factory	

Jackson Automobile Co.

1250 East Main Street
Jackson, Michigan

Wolverine Eight, Four-Passenger Cruiser



Important Announcement



A C



PRICES

Will advance June 15, '17

We ask the dealers to remember the fact that prices of A C Spark Plugs have never been advanced. We have stood all increased costs ourselves.

Although A C Plugs have already been adopted by 80 of the best pleasure car and truck manufacturers, we are determined to make a still Better Plug, and to do this means adding to our already rising costs.

A new schedule will, therefore, become effective June 15th.

The latest A C Plugs are better.

A C business means volume.

A C profits are substantial.

Every dealer should carry a full line of A C Plugs because the majority of cars carry them, because they are standard, in demand and make satisfied customers.

We take this opportunity to thank the dealers for the splendid co-operation they have given us.

CHAMPION IGNITION CO., Flint, Mich.

A The Standard Spark Plug of America C





A Wrench to Satisfy In Every Service

WALDEN-WORCESTER

Wrenches are recognized standard, practical time and labor-saving tools for all repair work



The WALDEN-WORCESTER catalogue illustrates, describes and prices a very great variety of types, shapes and sizes, but we are prepared to make up all kinds of handle shapes and sizes for special work.

The illustration shows a few of the wrenches manufactured for regular stock or special purposes, many of which are made in 10 or more different sizes.

Where a reasonable number of wrenches of special shape and length of handle are required, these can be supplied at practically no increased cost.

Car owners, dealers and repairers, send at once for the latest WALDEN-WORCESTER Wrench catalogue.

WALDEN-WORCESTER

INCORPORATED

WORCESTER, MASS.

GETTING FOREIGN BUSINESS

THERE are today a large number of American manufacturers of motor vehicles who are doing a most satisfactory business in foreign countries. Even as conditions are today, these keen, far-sighted, opportunity grasping, progressive concerns are rapidly perfecting selling channels which will permit them to dispose of a very considerable part of their output.

American products are already established in all foreign countries as standard goods, the best that can be produced. Thousands of foreign trade distributors are specializing in lines that are produced in this country. These are concerns that are well established. They are in a position to transact a large volume of business. This means certainly and distinctly that they can afford service to the buyers in their home field which will compare favorably with the service which domestic distributors supply to their patrons in this country.

Generally speaking, such connections in a foreign country are cash buyers, and, as they are now looking to America as the logical country to supply their needs, it is the opportune time for the producers in this country to explore foreign fields and reach all of the dealers who are in a position to place orders.

TRADE POSSIBILITIES UNLIMITED

The market of the world will soon be open to American manufacturers. It is waiting for American products. It is waiting for American service. There should not be an instant of hesitation. There is nothing mysterious in the act or details of entering into foreign business. The opportunities are unlimited. It is certainly the foresighted manufacturer who is now busily engaged in establishing his lines in the foreign field. Most emphatically he is establishing them on a permanent basis, almost as soon as he has made a beginning.

The way to enter foreign trade is simple. Not as an auxiliary, but as a direct channel, the Foreign Trade Bureau of the Automobile Journal opens the markets of the world to manufacturers. This bureau now enjoys a large membership, including concerns that produce vehicles, parts and equipment. Those who are affiliated with the Automobile Journal Foreign Trade Bureau are in direct touch with more than 8000 foreign dealers, in more than 85 foreign countries. Membership in this bureau is free to advertisers in the Automobile Journal. The great advantage afforded is that all members operate their own foreign departments, yet at practically no additional overhead.

REACH ALL BIG TRADE INTERESTS

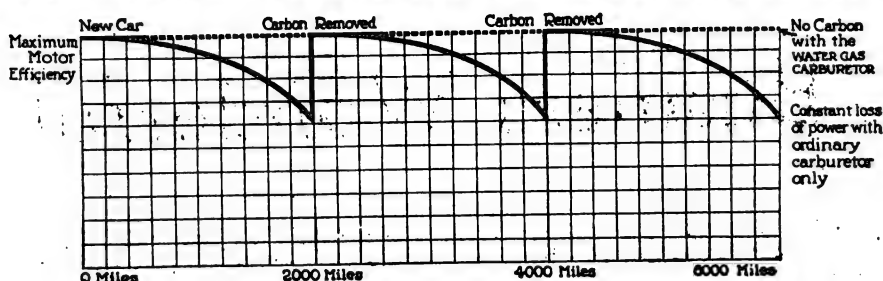
The concerns and individuals reached by the members in this bureau are the leading distributors in their respective countries. Most of them are what we would term importing jobbers, as they buy to sell again and to place lines with dealers who do not import products. This affords the members of the bureau the distinct opportunity to reap golden benefits through the zealous selling efforts of thousands of small dealers whom they could not reach in any other way than through this bureau.

The service is simple, complete and efficient. Besides constantly increasing in its worth to members, it supplies an immediate asset to any manufacturer of great value. It possesses result-producing factors that makes it a big feature in connection with any business that uses it.

The bureau is conducted under the personal direction of T. Wesley Wright, with offices in New York City. His services are free to members. Mr. Wright is without question one of the best informed export men in America. He has developed this bureau to a degree of efficiency that makes it a business proposition of magnitude, wholly serviceable, worthy of the utmost confidence, and that will bring a magnificent reward to those who utilize it. The American manufacturer must realize that a foreign department is the best promotion feature of the day and hour. The time to develop the foreign field is now.

Dash Sight-Feed
InstrumentBeautifully Designed
Highly FinishedThe Secret of the
Positive Feed ControlThe Driver's Assur-
ance of Performance

Carbon is the Reason For This Record of Inefficiency



The Water Gas Carburetor PREVENTS CARBON By Consuming it With Each Explosion

The Water Gas Carburetor does what Gasoline carburetors cannot do alone. It prevents the formation of carbon and the continual loss of power that results from it.

The reason why is simple. Air is only *one-fifth* oxygen. You can't get *enough* from it to burn up all the carbon. Water is *eight-tenths* oxygen. You can get from water the *extra* oxygen needed.

The Water Gas Carburetor is just a device to help out the gasoline carburetor. It feeds water into the cylinders in the form of super-heated steam. Each explosion of the motor is enriched by just enough steam to supply the extra oxygen to insure combustion of every particle of carbon. That's all. With this simple auxiliary attachment carbon cannot form and your motor will always be at top efficiency.

PROGRESSIVE DEALERS

Wake up to the tremendous possibilities of Water Gas Carburetor sales. The sky is the limit. Water Gas revolutionizes one of the motorists' greatest problems—CARBON.

The Water Gas Carburetor Company

Kansas City, Mo.
1502 Grand Avenue

New York City
345 Fifth Avenue

\$18.00

Complete
for
Any Car

The Water Gas Carburetor Company,
Kansas City, or New York City.
Gentlemen:—I am interested in learning the results
that your Water Gas Carburetors have obtained for
their owners.
Name.....
Address.....
City.....
Make of Car.....
Model.....

A.J. Jul

(When Writing to Advertisers, Please Mention The Automobile Journal.)



We Reo Folk Find Business Wonderful

WE'VE HEARD a good deal about how things were going to slow up—but we haven't heard a single logical reason why—and so far as Reo business is concerned, the reverse is true.

NEVER WAS A TIME when there were so many orders for cars and motor trucks on hand, unfilled, at the Reo factory.

NEVER A TIME when the demand was so greatly in excess of the factory output.

AND LAST MONTH was the biggest month in Reo history—this month of June will set another record if orders continue to flow in as they are now doing.

EACH MONTH HAS BEEN a bigger month than the preceding one.

WE ARE CONFIDENT not only that this state of affairs will continue but that still better business is ahead.

WE ARE LAYING our plans accordingly. Will make more Reos the coming year than ever before—in accordance with the Reo policy of conservative expansion.

THIS BUSINESS is run as a business—not as a game. Sound business principles only prevail.

REO BUYERS get full value for their money—a sterling product plus Reo service.

THAT IS ONE REASON why the demand for Reos is, today, greater than ever before.

THE OTHER REASON is that there never was, in the history of the world, such an era of prosperity—everybody working, everybody making good money.

AND BETTER BUSINESS is ahead—you can't figure it otherwise.

DEALERS WHO SELL REOS enjoy a steady prosperity. There's always a greater demand for than supply of Reos.

ESPECIALLY is this so of that great car, Reo the Fifth. At its present price it is veritably a gold dollar for ninety cents—and the ever increasing demand shows that all motorists are aware of that fact.

IT'S A GREAT LINE—this Reo line—comprising as it does Fours and Sixes and a complete line of motor trucks.

KEEP IN TOUCH with the Reo Sales Department—you never can tell. Some day, the chance you have been waiting for may occur.

Reo Motor Car Company

Lansing, Michigan

THE GOLD STANDARD
OF VALUES

(When Writing to Advertisers, Please Mention The Automobile Journal.)



A Twin Quad Wittmann Limousine Camp
To Accommodate Eight Passengers.

A Wittmann Limousine Camp

GO where the country is wildest, the scenery prettiest and the fishing best. Don't confine your vacation tour to beaten paths and crowded resorts. Sleep, eat and live out of doors; make each day's run as short or as long as you please, free from all the bother and expense of hotels.

Get a Wittmann Limousine Camp and carry your hotel on your running board. It is made to accommodate 2, 4, 6, or 8 people, with separate rooms for each two. The tent is made of featherweight balloon silk; weighs only 15 lbs. per person. It is absolutely rain, wind and insect-proof. The bed is up off the ground, insuring comfort and protection against dampness and cold. The Wittmann two-room camp can be set up or taken down in less than ten minutes.

The rooms are provided with screen covered windows and ventilators and curtains for privacy; individual clothes hangers and eight to ten feet of wall clothes pockets for each passenger. Remove two cotter pins and take out the beds: you have a day tent far superior to the ordinary tent--out-

side walls high enough to permit sitting erect. After supper get out the chairs, sit around the tent, start the Victrola, have some music, tell stories and enjoy the great care-free life that only an equipment such as this will afford you.

Write today for fuller details of limousine camp equipment. It is impossible to describe adequately the many features of flexibility and exclusiveness here. Many of these features will be fully appreciated only when you take your first trip with a Limousine Camp. We can promise immediate delivery on early orders. Don't delay. Your vacation will soon be here.

Liberal proposition for Dealers and Agents in unoccupied territory.

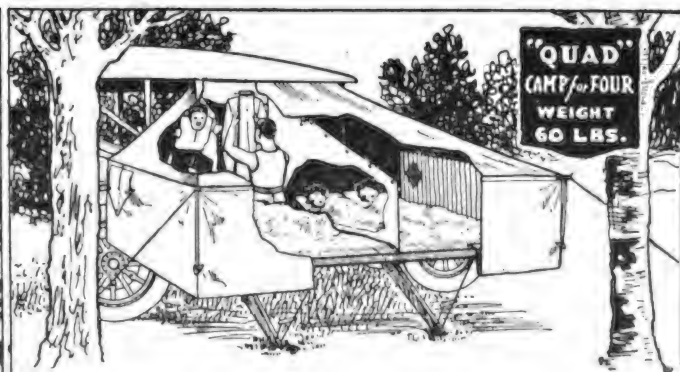
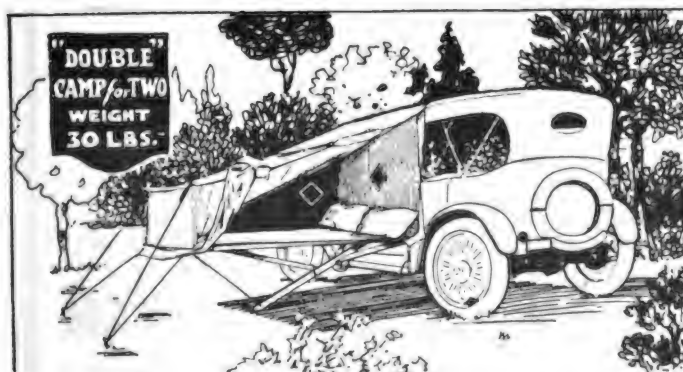
On Your Running Board



Wittmann Manufacturing Co.

1502 Grand Avenue
Kansas City Mo.

345 Fifth Avenue
New York City



(When Writing to Advertisers, Please Mention The Automobile Journal.)

AUTO BOOKS



50 Cts. a Week

Only 50c a week buys this brand-new automobile library. It is called **Automobile Engineering**, and in it you will find everything about modern automobiles. Almost two entire volumes are devoted to the new systems of ignition, starting and lighting. Welding, vulcanizing, and public garage equipment and operation are thoroughly covered. Five thick volumes, 5 $\frac{1}{4}$ x8 $\frac{3}{4}$ inches, flexibly bound in genuine morocco leather, gold stamped, 2,400 pages; 2,000 illustrations, tables and diagrams. Written in simple, easily-understood English, and carefully cross-indexed for quick reference.

SHIPPED FREE!

Don't send a penny. Just put your name and address in the coupon and we'll send all five volumes to you, express prepaid. Read them—study them—examine them carefully before you decide to buy. If you don't like them after 7 days—write us and we'll take them back at our expense. If you keep them, send only \$2.00 within 7 days, and then \$2.00 a month—50c a week—until the introductory price of \$16.80 has been paid. The regular price of this set will be \$25.00.

Partial List of Subjects
Motors, Welding, Motor Construction and Repair, Carburetors, Valves, Cooling, Lubrication, Fly-Wheels, Clutch, Transmission, Final Drive, Steering, Tires, Vulcanizing, Ignition, Starting and Lighting Systems, Wiring Diagrams, Shop Kinks, Commercial Garage Equipment, Electric Storage Batteries, Motorcycles, Commercial Trucks, Steam Cars, Glossary.

FREE SERVICE

In addition to the books you get free of all charge a \$12.00 Consulting Membership. If any question puzzles you—write us. Our corps of auto experts will solve your difficult problems. Ask all the questions you want for a whole year. This service is absolutely free.

MAIL THIS COUPON

See these books before you decide to buy. Remember—don't send us a penny. Just fill in and mail the coupon. This offer is open to any person living within the boundaries of the U. S. and Canada.

AMERICAN TECHNICAL SOCIETY
Chicago U.S.A.

Name

Address

Reference

American Technical Society
Dept. A 7965 Chicago, U.S.A.

Please send me a set of **Automobile Engineering** for 7 days' free examination. If I decide to buy, will send \$2 in 7 days and balance \$2 a month until \$16.80 has been paid, when books and Consulting Membership will be mine. Otherwise will notify you and hold books subject to your order. Title not to pass until fully paid.



**IT NEVER COULD HAPPEN
IF HE HAD
AN AUTO KIT**

EXPERIENCE

IS the great teacher. Use of tools and knowledge of their possibilities for economizing money, time and labor have convinced many thousand motorists that

BAY STATE Autokit Wrench Sets

are the most satisfactory, most useful, and, measured by any other standard, the most efficient hand tools obtainable.

These sets are selected tools—sockets, socketed shanks and ratchet handles, with which work can be done on any part of a car, conveniently, easily, and with perfect results.



BAY STATE AUTOKIT NO. 3

These sets are in three combinations:

Set No. 1, 31 Sockets	\$10.00
Set No. 2, 12 Sockets	7.50
Set No. 3, 11 Sockets (Ford Outfit)	4.00

Absolutely guaranteed to the buyer.

JOBBERS AND DEALERS: Let us send you trade quotations and literature.

GEORGE A. CUTTER

TAUNTON

Sales Agent

MASSACHUSETTS

A SURE LIGHT!
A HANDY LIGHT!
PLENTY OF IT!
CENTURY
Automobile Cigar Lighter



Price Complete, \$1.00

With a Century you can light your smoke while the car is going at the rate of one or one hundred miles. It is a car convenience, comfort and equipment of sterling merit. The cost is small, it is ever useful and it will last indefinitely.

The Century is made to operate on a six-volt storage battery. Neat in appearance, finished in black leather with nickel trimmings, push switch and seven feet of silk cord.

To attach: Run cord from battery up through floor at back of front seat, which will permit all passengers to use the light. Send for your Century today.

Exclusive Distributors

Mabey's Electric & Mfg. Co.
INDIANAPOLIS, IND.



It makes no
difference to the
Motorist who uses



Frosty or boiling hot, NON-FLUID OIL follows the gears steadily. It sticks to them "closer than a brother." It gives perfect protection against friction **ALL THE TIME**, even when the car is standing still. It is constantly performing its duty under normal or abnormal conditions. NON-FLUID OIL absorbs the wear that would otherwise fall on the gears.

NON-FLUID OIL doesn't have to be coaxed into working conditions by frictional heat like ordinary grease. It doesn't get thin and leak away—even in the hottest weather. Nor does it harden at low temperatures.

NON-FLUID OIL will outlast ordinary grease three times, and provide much better lubrication. Prove this on your own car. Get "K-OO Special" grade for gears, "K-OOO" for bearings. Your dealer has them—packed only in orange colored cans. Write for free book on "Lubrication of the Motor Car."

New York & New Jersey Lubricant Company
165 Broadway New York City

EMCO

Automobile OIL

The world's best petroleum refined by the most scientific method in the world's largest independent refinery.

Sold by dealers generally, or shipped anywhere by the refinery under a Money-back guarantee.

Prices and Samples on Request.



EMERY
MANUFACTURING CO.
Bradford, Pa.

Focus Your Headlights

WITH

RAND REFLECTORS

Eliminates glare, increases your driving light, penetrates fog. Permanent part of light. No cracking of lenses, no blackening of bulbs.

Rand Reflector Company, Inc.,
HAVERHILL, MASS.

NORTHERN ELECTRIC CO., Ltd., of Montreal
Distributors for Canada

NOW READY—FREE

Limited Abridged Edition Offered Free "Story of the Automobile"

By H. L. BARBER, Economist and Financial Writer
Author "Making Money Make Money," etc.

"STORY OF THE AUTOMOBILE" recites the history of the automobile's invention and comparative perfection from 1760 to 1917, tells how and why it became a commercial success, cites the benefits it has conferred, discusses the industry from all angles of finance, investment and future growth, gives figures of profits, gives a complete, up-to-date list of the pleasure and commercial cars made in the United States, with retail prices; includes chapter on "Amazing Figures of the Automobile Industry," by EDWARD G. WESTLAKE; another chapter entitled "Automobile, Accessories and Tire Manufacturers' Securities from the Investment Standpoint," by the BUSINESS BOURSE of New York. About 300 pages, illustrated with Charts and Comparative Tables, bound in Cloth, stamped in Gold, 8vo., \$1.50. For sale by leading booksellers. Trade supplied by A. C. McClurg & Co., Chicago; Baker & Taylor, New York City, and leading wholesalers.

Free While They Last For introductory purposes we are offering free and postpaid an Abridged Edition, with Flexible Cover—the complete volume will be on sale within a very short time. If you write at once you will be entitled to a copy of the Abridged Edition, without charge and prepaid—as long as they last. Act quickly as this first Limited Edition will soon be exhausted—write today.

A. J. MUNSON & CO., Publishers

Room 1805, Great Northern Building,

CHICAGO, ILL.

PRESTO PIPE CIGAR CIGARETTE LIGHTER

*A Touring Necessity and the Greatest Convenience
That Can be Installed in a Car*

A lighter that is used either with a holder or a winder, and coupled to a battery circuit is always instantly available, no matter what the speed or weather condition, for lighting pipe, cigar or cigarette.

The Tungstenite Chromium Nickel heating element is extremely enduring.

The Cord Winder releases or takes up the cord automatically and may be under the seat, behind the dash, at the side or in the most convenient place. It is the latest addition to the most complete series of cigar lighters ever made in America. In black rubber finish with silver name plate, or heavy brass, nickled, for a small additional price.

Presto Cigar Lighters are absolutely guaranteed and are warranted to be the best that skill and material can produce.



LIST PRICES

No. 199, "Tungstenite" Chromium Nickel 6-volt lighter tip, full nickel-plated holder, 5 feet of cord and Edison plug \$1.50

Cord winder, extra \$2.50

Both Lighter and Cord winder are illustrated.

METAL SPECIALTIES MFG CO.

732 WEST MUNROE ST.

CHICAGO, ILL.



WHY USE INFERIOR PLUGS WHEN CENTERFIRE

can be bought at the same price? They overcome all Engine troubles, fire where others fail and Add Power to engine. Any length point desired made to order. Try them and you will use them always. Make a trial and save money. \$1.00 each, 6 for \$5.00.

GUARANTEED

Agents wanted and special prices to dealers

Milwaukee Auto Specialty Co.,

705-707-709-711 Chestnut St.

MILWAUKEE, WIS

F-F BATTERY BOOSTER

MAGNETIC
RECTIFIER
Patented
April 1916



Keep your storage battery fully charged if you'd get the most out of it in service and length of life.

Plug into any convenient 110 volt 60 cycle alternating current lamp socket and connect the charging leads to the battery terminals. Leave battery right in car with all connections intact.

Ten cents worth of current over night insures a Positive Start, More Power and Brilliant Lights.

\$15 Complete.

Effective July 1st, \$18

F. O. B. Cleveland

Get Bulletin No. 15

THE FRANCE MANUFACTURING CO., Cleveland, Ohio.

J. H. bers and Dealers Throughout the United States and Canada.

NEW DEPARTURE BALL BEARINGS

American Made
FOR
American Trade
QUALITY
FIRST

THE NEW DEPARTURE
MANUFACTURING CO.
CONRAD PATENTS LICENSEE
BRISTOL, CONN., U.S.A.

Inter-State

SIX BODY STYLES

\$850 to \$1325

Write today for complete catalogue and territory information.

Full line of export models for foreign markets. Prices on application.

Inter-State Motor Co.,

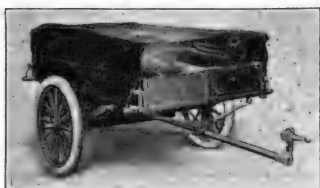
Muncie, Ind.

(When Writing to Advertisers, Please Mention The Automobile Journal.)

Tour Anywhere Without Hotel Bills

Hitch an Auto-Kamp Trailer to your car. Be at home anywhere with a completely equipped living and sleeping tent, electric light, two full size beds, cook stove, ice box, complete cooking outfit, dishes, cutlery and dust-proof food compartment that carries an ample supply of food for several people.

The "Auto-Kamp" Trailer



saves hotel bills, garage expenses, delays and discomfort. Pays for itself in one season and makes touring or outing trips very inexpensive. Last summer a party of four made a two weeks' trip with an Auto-Kamp at a total expense of only \$24—less than 50 cents a day apiece. It's cheaper than staying at home and lots of fun.

The Auto-Kamp attaches by universal socket joint. Adjustable to any car, and folds compactly like a Pullman berth. It follows your rear wheels around corners or turns, at any speed and over any kind of roads. You can set it up anywhere you choose in seven minutes. Make camp beside the road, under a great oak, near a beautiful river or lake in the forest—anywhere.

Don't Delay—Write for Book

Complete specifications and terms. Get full information about the Auto-Kamp Trailer. Read the testimonials of users. But do it now—before you forget, as later we may not be able to accept your order.

The Auto-Kamp Equipment Co.

2116 Sheridan Avenue

SAGINAW

MICHIGAN

Comply With Law and the Dictates of Humanity

AVOID ACCIDENTS

BY USING

Lennon Light Protectors



Action of Lennon Light Protector

Efficient yet inexpensive. Light of weight—simple—no springs or parts to break. Fit any headlight—easy to attach.

EFFICIENT yet INEXPENSIVE

Controls all the light to the road and insures **SAFETY** for yourself and others.

Retail Price **\$1.00** the Pair

Fawcoco Improved Combination Gasoline Gauge

Oil Cock Wrench and Cleaner

STOP CRAWLING
UNDERNEATH
YOUR CAR

For FORD Cars

GET AT YOUR
OIL COCKS
WITH EASE

35¢

FAWCO IMPROVED COMBINATION
OIL COCK WRENCH
AND GASOLINE GAUGE

THE PIN
CLEARS ANY STOPPAGE

Large Easel Display Card Like Above With Each Dozen Order.

EVERY FORD OWNER

needs this inexpensive tool. Measures gasoline in tank and tells whether you have oil in crank case. The pin will prove if oil cock is stopped up or oil exhausted.

DEMONSTRATES ABSOLUTELY if
you have both OIL and GASOLINE

Price 35 cents

DEALERS

Packed one dozen in heavy carton; one mounted on handsome display card; balance in separate envelopes.

Usual liberal trade discount

Manufactured by

J. H. FAW, Inc., Manufacturers and Distributors of
STANDARD ACCESSORIES

41 Warren St., NEW YORK

Branch, Atlanta, Ga.

Our Literature on Request.



Charles River,
Mass.

Supreme Upholstery

When a dealer or manufacturer sells you a car upholstered in Du Pont Fabrikoid, Motor Quality, he sells you something infinitely superior to the average so-called "genuine leather" or coated "splits." He gives you a standard material—standard in quality service, appearance and wear. A scientifically constructed leather-like fabric twice as strong as coated "splits."

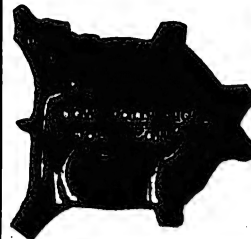


MOTOR QUALITY

has all the artistic beauty and looks of the finest leather, with none of leather's faults. It is water, dust, grease and stain proof and sincerely guaranteed.

It comes in standard rolls and standard widths. It saves the car manufacturer time, labor and expense, because it can be cut in multiples and eliminates waste. It guarantees each car purchaser better satisfaction because it gives greater service.

Write for samples and booklet.



DuPont Fabrikoid Co.

Wilmington, Del.

Works at Newburgh, N. Y. and
Fairfield, Conn.

Canadian Office and Factory, Toronto

*World's Largest Makers
of Leather Substitutes*

SIMON Touring Equipment



Running Board Trunks, two suit case capacity; revolving door Tire Trunks, regular or demountable rims; Roadster Trunks, flat or sloping top.

Suit Case Trunks, with steel frame suit cases. Unequaled for quality, utility or finish. Built of finest stock in sizes for different cars; dust proof, hand riveted, with brass locks.

Running Board Trunks, two suit cases, 11½ in. wide and 15 in. high, 28, 30 and 32 in. length; two qualities.

Revolving Door Tire Trunks, 22 to 26 in. diameter; special models for Fords.

Roadster Trunks, 12 in. high, 28 and 30 in. length; 15 in. high, 28 and 30 in. length.

Suit Case Trunks, two and three cases, 15 in. high, 28, 30 and 32 in. length.

Two-Piece Hood and Radiator Covers, Draft Shield, Rear Light Window, Curtain Carrier, Lamp Dimmer, Ford Cars; Door Pockets, Ford Cars; Adjustable Hood and Radiator Cover, 1917 Ford Cars; Radiator Covers; 600 patterns.


Send for Catalogue. Equip right and save money.

S. C. SIMON & CO. 404-12 Brown St., Phil., Pa.


(When Writing to Advertisers, Please Mention The Automobile Journal.)

HEINZE


**High Tension
MAGNETO**
Original in Design,
Superior in Quality.



Factories
Lansing,
Mich.
Branches
Chicago.



Known
users
better



Sales Offices
Detroit,
Mich.
Branches
New York

by all
as the
Magnetos

HEINZE ELECTRIC COMPANY

It Smothers the Bump



**Hartford
BUMP ABSORBER**
—more than a Bumper

**THE
NATIONAL
GUARD
FOR MOTOR CARS**

EDWARD V. HARTFORD, INC.
147 Morgan St. JERSEY CITY, N. J.



You Can Use Your Car All Year
Round If You Heat Your
Garage With a
"SUPERIOR" or a "COSY"
Safe Garage Heater
All air taken from outside building.
No gasoline fumes can enter heater.

Superior Manufacturing Co.
N. S., PITTSBURGH, PA.

OLD SOL

NITROJECTOR NO 100

—THE MOST PERFECT SPOTLIGHT—
Hawthorne Mfg. Co., Inc., Bridgeport, Conn., U.S.A.
MAKERS OF OLD SOL WINDSHIELD SPOT-
LIGHTS AND ELECTRIC LIGHTING DEVICES

VALVOLINE OIL CO.

Heavy, Medium and Light
Automobile Oils
27 STATE STREET BOSTON, MASS.

\$2.00 THE YEAR
The Accessory and Garage Journal
The National Trade Authority
TIMES BUILDING, PAWTUCKET, R. I.



YOU never have really tried
Magnetos Ignition, never real-
ly experienced the advantages
of the confidence it imparts, the
efficiency it provides, the reliability
it assures, until you have used

BOSCH

MAGNETO IGNITION

Bosch Magneto Co., 204 West 46th St., New York

\$1.00 Saved—\$2.00 Earned
*What Does \$5.00 or \$10.00
Mean to you?*

WORLD'S LARGEST DEALERS
**NEW STANDARD MAKE
FACTORY BLEMISHED TIRES**

(Seconds)

Big Savings—Write for Prices

JANDORF AUTO COMPANY
1763 Broadway NEW YORK

TIRES GUARANTEED

**50 to
75%
Saved**

Compare These Prices:

Size	Tires	Tubes	Size	Tires	Tubes
28x3	\$6.10	\$2.35	33x4	\$12.00	\$4.20
30x3	6.50	2.40	34x4	12.00	4.30
30x3 1/2	8.25	2.85	35x4	13.00	4.45
31x3 1/2	9.00	3.00	36x4	13.50	4.55
32x3 1/2	9.50	3.10	34x4 1/2	14.00	5.40
34x3 1/2	10.00	3.30	35x4 1/2	14.50	5.55
36x4	10.00		36x4 1/2	15.00	5.60
31x4	10.00	3.00	37x4 1/2	15.50	5.80
32x4	11.00	4.05	37x5	17.00	6.75

New illustrated catalog will tell you HOW. Send for it now. OUR TIRES are practically puncture-proof and blow-out proof. Guaranteed for 3500 miles. Your old tires taken in exchange.

Prices same for Plain and Non-Skid Treads. Tires are sent subject to examination. C. O. D. Shipments. 10 per cent. deposit required.

Tuxedo Auto Tire Exchange, 304-A West 54th Street
NEW YORK CITY

(When Writing to Advertisers, Please Mention The Automobile Journal.)



FLOATING PLUNGER WHEEL PULLER



Makes a "Frozen" or "Stuck" wheel come off easily. Strike the plunger, turn the screw, strike again and the wheel comes off without injury to hub-threads, spokes or axle.

Made for the following cars:

Abbott	Lexington
Apperson	Liberty
Auburn	Maxwell
Buick	Milburn Electric
Case	Mitchell
Chalmers	Moline Knight
Chandler	Oakland
Chevrolet	Oldsmobile
Daniels	Overland
Davis	Paige
Dort	Peerless
Empire	Pierce Arrow
Ford	Premier
Franklin	Reo
Hudson	Saxon
Interstate	Velie
Jeffery	Vim
Jordan	Westcott

*Your jobber has them in stock.
New models continually being added.
List of models and prices on application.*



Timer For Ford Car



Extra heavy pressed steel shell, aluminum finish. Insulating ring of gray bone fibre. Terminals insulated all the way through. One-hand, self-closing oiler. Pressed steel arm and compression spring on brush assembly. Brush assembly sold separately. Interesting prices.

MOTOR SPECIALTIES CO.

MANUFACTURERS

WALTHAM

MASS.

ZENITH CARBURETOR

KNOWN the world over as the *zenith* of carburetor efficiency. A long list of American builders of cars, trucks and aeroplanes believe this simple, plain tube device to be the best insurance for permanent carburetor satisfaction.

Zenith Carburetor Co.
New York Detroit, U.S.A. Chicago



Ask For The Best Wrench

Your dealer will show you just the size you need for your tool kit, or for repair work.

He will recommend the COES wrenches as all good dealers have done for fifty years.

Coes Wrenches do not break, or wear out, in service life they cost less than any other tool made.

COES WRENCH CO.
WORCESTER, MASS.



WONDER-LUST

THE ORIGINAL
SPRAYER POLISH

You can get it anywhere.

PAIGE

The Most Beautiful Car in America

It is a well known fact that Paige Dealers are among the biggest money makers in the Motor Car Field.

An inspection of the Paige line will explain why. Write for complete particulars.

PAIGE-DETROIT MOTOR CAR COMPANY, Detroit, Michigan

"THE TENTH ANNIVERSARY CAR."

REGAL-HI-POWER-FOUR Four Cylinder Motor Full 30 H. P. 108 Inch Wheelbase

\$745

REGAL MOTOR CAR CO., 'Dept. B.' Detroit, Mich.

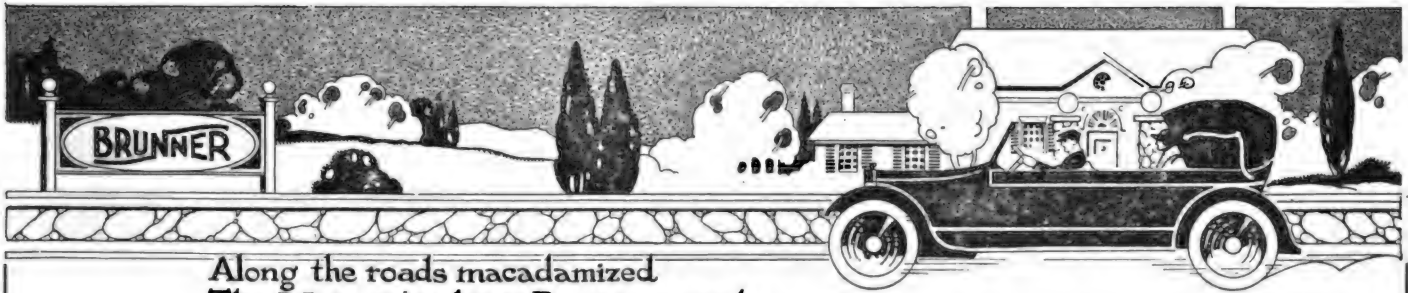
DIXON'S
Automobile
LUBRICANTS

Prevent all metal-to-metal contact. The selected flake motor graphite can't ball-up a pack. The minute flakes form over the bearing surfaces a velvety, oily veneer. Send for booklet 210-G.

Made in Jersey City, N. J. by the

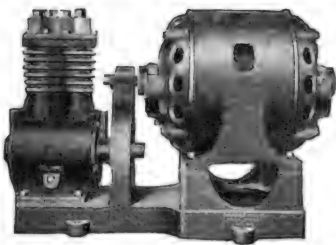
JOSEPH DIXON CRUCIBLE COMPANY

Established 1827



Along the roads macadamized
 The Motorist who is Brunner-wised—
 Speeds smooth-with danger minimized
 Because his tires are Brunner-ized—

THE pleasures of motoring are enhanced and the dangers are minimized when tires are properly inflated—smooth rides with danger of blow-outs lessened are insured by Brunner Service—and that is why the Brunnerwise Motorist patronizes the garage displaying the Brunner sign.



Ever since the garage business has been a business the Brunner Air Compressor has been consistently demonstrating its sterling worth to the garageman—in the garage. Year after year the demand for Brunner Air Compressor Equipment has been doubling over, simply because the Brunner Air Compressor has always stood up and given satisfactory service. The motorist who patronizes the garage displaying the Brunner Sign always finds an ample supply of clean, cool air at the proper pressure to inflate his tires correctly at his disposal.

THE BRUNNER SIGN ATTRACTS THE TRADE OF THE BRUNNERWISE MOTORIST

Because he knows that the garage displaying the Brunner Sign is always prepared to render him prompt and efficient compressed air service—he knows that when he pulls up under the Brunner Sign he never has to drive away disappointed.



He realizes that clean, cool air, such as he always finds at his disposal under the Brunner Sign, will increase his tire mileage and will reduce the dangers of motoring to a minimum. That is why the trade of the Brunnerwise Motorist follows the Brunner sign.

The Safe Way Is the Brunner Way

The Brunner Air Compressor has always proven true to the Jobber who sells it—the Garageman who buys it—and the Motorist who uses it—are you Brunnerwise?

The Garageman who buys Brunner Equipment is never disappointed, for the reason that it has never been necessary to resort to misleading advertising claims in order to bolster up the sale of Brunner Equipment, and the garageman purchasing Brunner Equipment always receives just what he expects and "a little bit more."



INVESTIGATE THE **BRUNNER** AIR COMPRESSOR

Be honest with yourself and investigate the garage air compressor question thoroughly before deciding on your new equipment. The Brunner will stand investigating and the more thorough the investigation the more certain will be your decision in favor of Brunner Service, because it not only insures compressed air efficiency of the very highest order, but it also insures that very desirable and liberal patronage of the Brunnerwise Motorist, which follows the Brunner Sign.

We will be glad to send you the name of the Brunner Jobber who covers your town, also our catalogue and Garageman's Handbook on Compressed Air—a book which every garageman should read carefully. They are all free for the asking.

BRUNNER MANUFACTURING COMPANY

Main Office and Plant:
 UTICA,
 N. Y.

Cincinnati Branch:
 Cincinnati, Ohio.



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INDEX TO ADVERTISERS



EAGLEINE OILS

are unequalled for motor lubrication, freer from carbon, economical because they protect the motor against mechanical wear, and the quantity required is comparatively small.

These are the claims of thousands of motorists,—some with years of experience, who want full value, and more who know the value of high grade lubricants, and who know when they obtain satisfaction.

EAGLEINE QUALITY IS INSURED TO YOU

A grade for every type of motor.
It is sold in sealed containers.

*Let us send you our new book and chart.
It is free at request.*

EAGLE OIL AND SUPPLY CO.

44-45-46 India Street, Boston, Mass.

NEW YORK CITY
Woolworth Building

CHICAGO
1132 W. 37th Street

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Ford Size Tires

New 30x3½ Non-Skid. (Unguaranteed)

\$7.50

Jandorf Automobile Co.
1763 Broadway, New York

PIERCE Governors For Ford Cars

The owner's hand controls the speed of every PIERCE equipped Ford truck or delivery wagon, no matter when or where it is driven. It makes no difference who the driver is, he cannot exceed the speed for which the governor is set—and the owner decides the speed.

A PIERCE GOVERNOR don't cripple the motor when heavy loads, steep grades, or slippery traction demand extreme power. It is the only governor made that will control the speed of a Ford truck, and leave the motor entirely free in reverse and low gears.

Stop fast driving and you eliminate 75% of all collisions and accidents—reduce repair costs one half - and make tires wear longer. PIERCE GOVERNORS pay for themselves a dozen times a year.

A live proposition for live dealers
PIERCE GOVERNOR COMPANY
World's Largest Governor Builders.
ANDERSON, INDIANA, U.S.A.

Sell *Harvey* Springs

—and Gain Good Will

The **good will** customer is the greatest asset you can have. Every time you sell a Harvey Spring you make a life-time customer—you gain his good will because you *satisfy* him. Our guarantee—on every spring—protects both you and your customer.

Harvey Springs Do Not Break

They're guaranteed from end to end against *all* defects. Made in all sizes for over 600 of the leading makes and models of cars. Every Harvey Spring is an exact duplicate of the one it is intended to replace and fits with an accuracy that will surprise you.

FREE

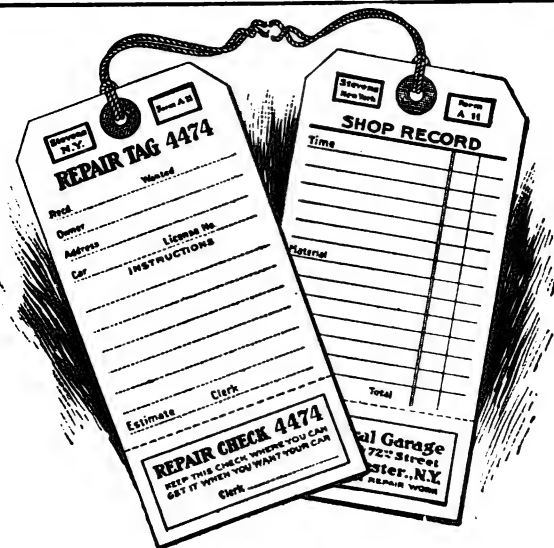
The Harvey Spring Book shows sizes, weights, measurements, prices, etc. It enables you to tell at a glance

just what spring you want and prevents mistakes in ordering replacements. Write for a copy and name of nearest Harvey jobber.

THE HARVEY SPRING CO.

851 17th Street

RACINE, WIS.



REPAIR TAGS

The Stevens Auto Repair Tags form a convenient simplified accounting system for the busy dealer and repairman. Increases shop profits by gaining confidence of customers and eliminating errors. Numbered serially with detachable check. Large size coated colored stock. Printed on both sides with 12" strings. Back of check blank ready for your imprint.

Printed in large quantities we are able to give dealer advantage of low costs

Price per 1000 - \$5.00

Stevens & Co. STEVENS NEW YORK 375 Broadway

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List Price, 75 Cents Each

An Ideal Equipment For Cars Without Door Pockets

that can be quickly installed and affords extreme convenience. Made of highest grade leather cloth, that will not crack or peel and has longer endurance than leather.

A fast selling profitable accessory. When ordering always state whether for Ford or Chevrolet.

Martin leather cloth specialties, the finest line made, includes Tire Covers, Radiator Robes, Tube Cases, Engine Robes, Robe Rail Bags, Water Buckets, Headlight Dimmers, Etc. Not equalled for quality, and sold for moderate prices.

Write for Jobbers' and Dealers' Catalogue and Quotations

Martin Manufacturing Co.

LANCASTER

OHIO

(When Writing to Advertisers, Please Mention The Automobile Journal.)



FLOATING PLUNGER WHEEL PULLER



Makes a "Frozen" or "Stuck" wheel come off easily. Strike the plunger, turn the screw, strike again and the wheel comes off without injury to hub-threads, spokes or axle.

Made for the following cars:

Abbott	Lexington
Apperson	Liberty
Auburn	Maxwell
Buick	Milburn Electric
Case	Mitchell
Chalmers	Moline Knight
Chandler	Oakland
Chevrolet	Oldsmobile
Daniels	Overland
Davis	Paige
Dort	Peerless
Empire	Pierce Arrow
Ford	Premier
Franklin	Reo
Hudson	Saxon
Interstate	Velie
Jeffery	Vim
Jordan	Westcott

*Your jobber has them in stock.
New models continually being added.
List of models and prices on application.*



Timer For Ford Car



Extra heavy pressed steel shell, aluminum finish. Insulating ring of gray bone fibre. Terminals insulated all the way through. One-hand, self-closing oiler. Pressed steel arm and compression spring on brush assembly. Brush assembly sold separately. Interesting prices.

MOTOR SPECIALTIES CO.

MANUFACTURERS

WALTHAM

MASS.

DO YOU HEAR

the UTILITY KID signaling
you to go ahead and get

UTILITY VARNISH RENOVATOR

GO AHEAD



*It is Incomparable in Its Results—Complete
Satisfaction for the Users and
Big Business for the Dealer*

It cleans and polishes the car body, maintains the finish at factory appearance; restores the old car to practically new in sightliness, and protects the varnish so that it is not influenced by water, dust or climatic changes; it brightens leather to its original condition and makes it soft and pliable; it insures against water-breaks, blistering and checking, and dissolves ROAD OIL and TAR compounds.

**IT IS GUARANTEED NOT TO
INJURE ANY VARNISH FINISH
ON WHICH IT IS USED, AND
TWICE THE AREA CAN BE
COVERED THAN WITH ANY
OTHER COMPOUND.**

Garages and Repairmen use it constantly on all cars. It eliminates the need of washing cars with soap and water. It saves time and labor and will more than save its cost in painting and economy. It is sold in trade marked containers and in quantities to suit purchasers.



*It is unequalled as a
furniture polish.*

List Prices :

4 ounce	25c
12 ounce	50c
Quarts	\$1.00
Gallons	3.00
Sprayer	25c

JOBBERs and DEALERs: We want to tell you of the best sales proposition of the year. We offer a big profit-making contract that means more business for business men. Write for it.

Poughkeepsie Utilities Corp.

46 WINNIKEE AVENUE,

Poughkeepsie

New York

(When Writing to Advertisers, Please Mention The Automobile Journal.)

MAXFER

MEANS ECONOMY

ECONOMY MEANS SUCCESS

Maxfer Carries — Ford Pulls

THIS advertisement has been written by our dealers—every line and illustration has come from their suggestions. The Maxfer makes a Ford, used or new, into a Maxfer Truck in less time than any other device invented.

It seems impossible that a dealer will take on an agency for any other truck maker except the *MAXFER*, for the reason that all of them—except the Maxfer—require special machine tools and skilled mechanics to convert a Ford, used or new, into a ton truck.

The Maxfer makes a Ford, used or new, into a Maxfer one-ton truck (guaranteed overload 50 per cent) at a cost of \$350 and a Ford. One mechanic and a helper can make this conversion inside of 3 hours. The only tools used are illustrated on the right hand side of this page.

The Maxfer slips around and over the Ford, strengthening it all the way. The Ford frame is not cut off. The Ford axle is not cut off. You are only required to remove the rear wheels and the rear spring of the Ford car and then the Maxfer slips over and around the Ford frame, making the Maxfer ton truck.

1200 Dealers have realized this economy. 14,000 Business men and Farmers have realized this economy.

Can you, as a dealer, reading this advertisement, stay out of the Maxfer organization when you have this weight of opinion of 1200 dealers and 14,000 business men and farmers?

*Write or wire us today. Your territory may still be open.
Use the Coupon on the right hand side.*

Maxfer Truck and Tractor Co.

910 So. Michigan Avenue
Chicago, Ill.

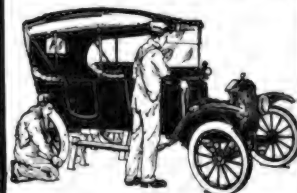
MAXFER
THE WHALE FOR WORK
TON TRUCK

\$350

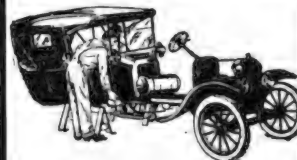
And a FORD



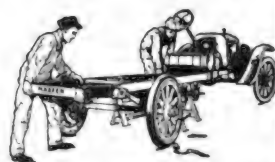
Tools used to make a **MAXFER** TON TRUCK



Removing Ford rear wheels



Taking off the body



Making a **MAXFER** one ton truck



Putting on **MAXFER** Bell sprocket

Maxfer Truck & Tractor Co.
910 So. Michigan Ave.
Chicago, Ill.

Please mail me full particulars
regarding Maxfer Truck.

Name

Address

City State

AG 16-17

(When Writing to Advertisers, Please Mention The Automobile Journal.)

NEW YORK

CHICAGO

CLEVELAND

BOSTON

DETROIT

Subscriptions:

The United States and Mexico, \$1.50 a year;
Canada, \$2.50 a year.
Foreign Countries in Postal Union, \$3.50 a year.

AUTOMOBILE JOURNAL

Remittances:

Should be made by Check, Draft, Postoffice or Express Money Order, or Registered Letter. Money enclosures must be at sender's risk.

Entered as second class matter, April 15, 1906, at the Postoffice at Pawtucket, R. I., under act of Congress of March 3, 1879.

Ten Cents
a Copy

VOL. LXIII.

JUNE 25, 1917.

NO. 10.

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Treasurer . . . WILLIAM H. BLACK

Secretary . . . D. O. BLACK, JR.

Published the 10th and 25th of each month by the

AUTOMOBILE JOURNAL PUB. CO.

Times Building, Pawtucket, R. I.

WHILE every industry has onslaughts made upon it from without, there also come times when an important phase of commerce comes to a point where there is necessity of some reforms from within. The automobile trade is no exception to this general law of business. The present case in point relates to trade practises which have grown up around the sale of a vehicle, when, at the same time a used conveyance is to be accepted as part payment on the new car. The surprising fact came out at the time that the government was proposing to place an unheard of tax upon the selling of new automobiles, that for every 10 new cars sold, eight were taken in exchange. The used car trade has risen by leaps and bounds, and today it is one of the most troublesome problems on the commercial side of the industry, mainly because there is a disposition in some quarters to overturn the ordinary law of supply and demand and substitute therefore a rule of thumb which is found in practise to work harm to the car owner, dealer and maker when pursued to its last analysis.

IN THE July 10 issue of the Automobile Journal the subject will be taken up in its deeper phases. There will be full analytical information on the value that inheres in used automobiles, and which no arbitrary price list can dissolve. Prospective buyers of used cars will be told how to go about buying them with security, and in a way that will insure their obtaining full value for every dollar they part with. The owner who wants a new car will be aided by valuable hints also, and it goes without saying that the making of satisfied customers is the best thing that can happen for dealer and manufacturer. See our next issue, July 10.

THIS issue of the magazine is found to be replete with those features that its thousands of readers fully appreciate. The fourth plate in the series of garages designed specially by the Architectural Department of the Automobile Journal Publishing Company will be found on page 30. This particular design is of a brick garage for one car and its points of construction are so thoroughly given in the accompanying drawing that a competent builder may soon transform it into a reality for a car owner who wishes to have a substantial housing for his car.

THE department conducted by the National Automobile Association gives this time the itineraries for tours from eight important eastern seaboard centres. The cities chosen are New York, Albany, Hartford, Providence, Boston, Montpelier, Concord, N. H., and Portland, Me. Short trips are shown from some of the cities. For the midsummer vacation days these bits of touring information are very timely.

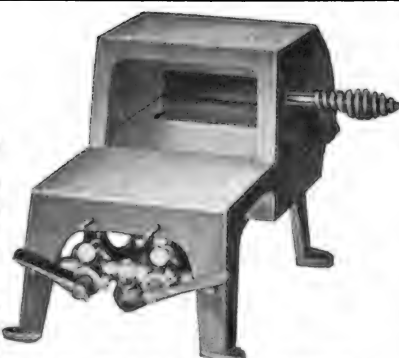
MOTORDOM never ceases to be interested in the progress of events in the great problems which the country faces because of the entrance into the world war. The automotive engineers and the farmers in the field fill places of importance hardly second to the men behind the guns. Each of these interests have attacked their problems in earnest. The part that is played by the automobile and the tractor is tremendous. The great questions of food production are deeply involved, and it is good to see the nation fully awakened to the great responsibilities that rest upon it.

SUBSCRIBERS when giving us notice of a change in location should always be sure to supply the old as well as the new address.

Do Repair Jobs Quicker

The Johnson No. 101 Bench Furnace is the handiest gas appliance for heating soldering coppers, hatchet irons, for case-hardening, heating for tempering or annealing.

It is equipped with two powerful atmospheric burners that obtain instantly a heat of 1600 to 1800 degrees F. in the heating chamber.



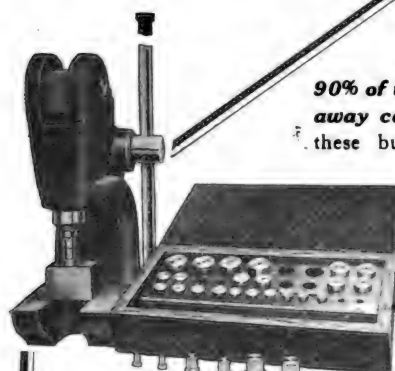
NO FORCED BLAST REQUIRED

Unequalled for manufacturers as well as garages and repair shops. If your jobber cannot supply you, write us direct for No. 101 Johnson Furnace, or free illustrated literature.

Johnson Gas Appliance Co., - - Cedar Rapids, Iowa

With a Johnson Gas Furnace

Takes the place of an expensive blast furnace. Perfect combustion is insured, regardless of the pressure or quality of the gas. There's no soot or dirt. No danger of decarbonization because of neutral flame. Lights instantly from pilot. Uses either manufactured or natural gas.



Swedges in all sizes from 7-16" to 1 3-16"

Don't Junk Your Old Bushings!

90% of the Bushings that have always been thrown away can be made better than when new! After these bushings have been put through one of our Bushing Presses, the metal is closer-grained and the bushing fits tighter. *One fifth of the expense and labor in overhauling a car goes into the bushings.*

With our Bushing Press you can take a set of six connecting rods, and in less than half an hour swedge and

ream them to a perfect fit. These are better than new bushings, which would have cost at least ten dollars—pretty good pay for a half hour's work! The Beach Bushing Press saves all the cost of new stock; no delay from sending to the factory; no necessity to carry in stock a dozen different size bars of cored bronze. *Write us today!*

BEACH PROCESS BUSHING PRESS

THE GREB COMPANY, 202 State Street, BOSTON, MASS.



IT MAKES THEM THINK

AMERICAN ELECTRIC AIR PUMP

EMPLOYING the ROTARY principle, the American Electric has these distinct advantages: It is the most compact, simple, durable, economical and efficient air pump made. It can be placed anywhere. Supplies air direct to the tires or can be coupled with a storage tank. Driven by direct or alternating current. Automatic lubrication. Dust and dirt proof. No packing used. Fully guaranteed.

JOBBERs and DEALERs—We are offering special inducements to the trade. You can sell the American Electric and can swing the pump business in your territory. A proposition that once sold stays sold.

AMERICAN ELECTRIC AIR PUMP CO., 222 Penn Ave. PITTSBURGH, PA.

FREE AIR

COSTS MONEY

when the customers for whose convenience you provide an air station forget to turn off the flow after they have filled their tires.



Guard against this waste by attaching a **Schrader Automatic Inflating Valve** to your air hose.

Thanks to this appliance your bottled air locks itself into the tank the minute it is taken off the tire-valve. You turn on the air by pressing the nozzle of the inflating valve against the tire-valve and you turn it off by removing the device from the tire-valve.

Made to fit any diameter of hose from 1-4 in. to 5-8 in.

PRICE ONE DOLLAR

in U. S. A.

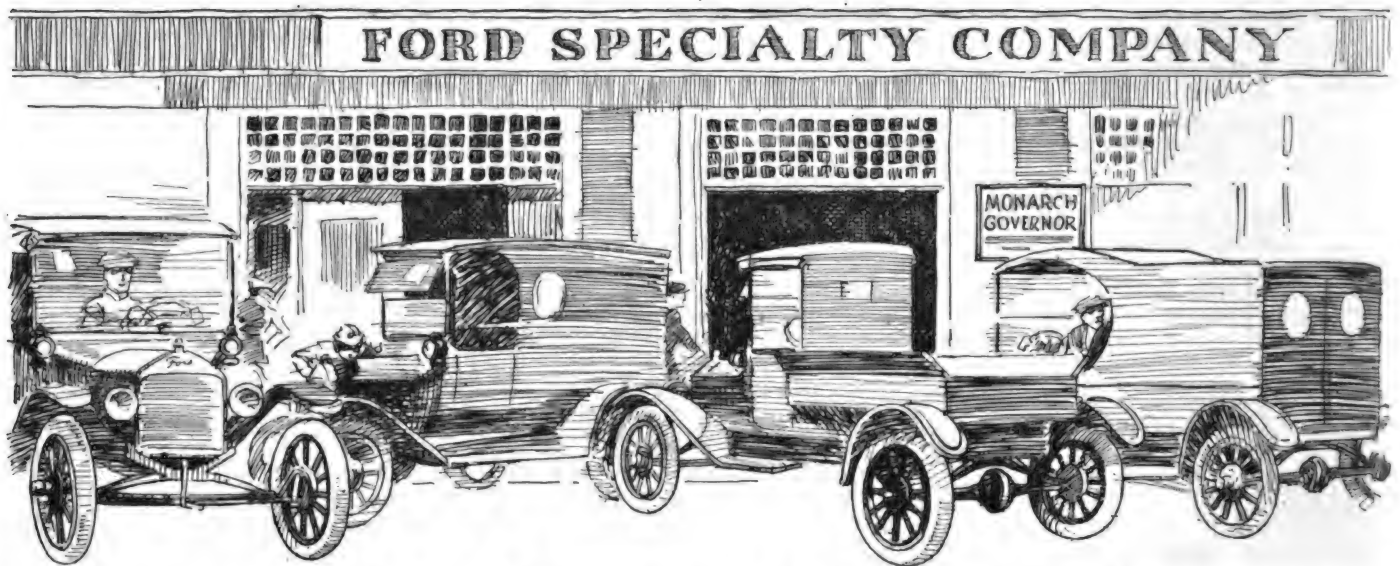
Manufactured by

A. SCHRADER'S SON, Inc.
800 Atlantic Avenue, Brooklyn, N. Y.

Schrader products were awarded a Grand Prize and two Gold Medals at the Panama Pacific International Exposition. "There's a reason."

"I predict that in six months' time hardly a Ford will be put into delivery work, truck work or tractor work without a Monarch Governor—and hundreds of thousands are needed on present cars."

—J. W. Anderson.



You can sell a Monarch Governor for every Ford Commercial Car in your Territory

Strong statement—but it's true. You know excessive speed causes more Ford troubles than everything else put together. If you've sold Fords for delivery

service, or Ford ton-attachments, you've probably prayed for some device that would keep irresponsible drivers from reckless racing. Owners feel the same way.

\$25

COMPLETE WITH
INTAKE MANIFOLD

**MONARCH
FOR FORD CARS
GOVERNOR**

\$25

CAN BE INSTALLED
IN A FEW MINUTES

The Monarch Governor solves the big problem of excessive speeding. It was created in response to a country-wide demand, and it is the only speed-regulating device that will work on the Ford motor.

The large number of enthusiastic users proves Monarch practicability. Entire fleets of Ford commercial cars are being equipped with Monarch Governors. Sales come easily—Ford users have always wanted just such a device.

Our proposition to dealers is liberal. We'll work with you in developing prospects—we only ask that you work with us in closing them. National advertising is convincing

thousands of prospects and we say to you "Get in line at once for your share of this enormous business." The retail price of \$25 is saved to the owner many times a year—and he realizes it. Write today and we'll get full details right back to you—we want to handle Monarch sales through you.



MONARCH GOVERNOR COMPANY, 524 Bethune Ave., West, DETROIT, MICH.

Limits *the* Speed *and* the Expense

(When Writing to Advertisers, Please Mention The Automobile Journal.)

The Automobile Journal

XLIII.

JUNE 25, 1917.

NO. 10.

SET PRICES FOR USED CARS CREATING HAVOC IN AUTOMOBILE TRADE

**Raw, Scuttle Policy Found Destructive and Harmful to the Owner, Dealer and
Manufacturer—Facts About the Real Used Car Market COMING In
the July 10 Issue of the Automobile Journal**

ENORMOUS PERCENTAGE OF BUSINESS RESTRICTED BY GROWING EVIL

**Putting Sound Business into Used Car Transactions Demanded Before It Is Too
Late—Grief in Store for All Interests Unless Action is Taken to
Conserve and Protect Their Welfare**

THE Automobile Journal believes that the movement to set an established price on used cars, advocated by a number of trade papers and some organizations, is a factor that will do more to retard the automobile business and to handicap the interests of the manufacturer and his representatives, wherever located, than the havoc possible from a submarine fleet cut loose in New York harbor.

No Submarining Wanted in Automobile Business.

There is no virtue in being submarined in the automobile or any other business. Most particularly in the automobile trade at this time is it particularly desirable to keep transportation units on the highways moving steadily and efficiently. Under the plan of a fixed price per model on a car, without regard to its mechanical condition, except for the point that it is capable of operation, there is much grief in store for the owners of well equipped, well cared for automobiles throughout the country.

Manufacturers Should Discourage Torpedoing.

With the exception of a very few manufacturers of pleasure cars, or, as they may more properly be termed in the light of their great services to these times—passenger cars, the other manufacturers, to conserve and protect their welfare, should discourage any individual or body bent on placing a set price on any make or model of vehicle which they produce.

Surprising Facts About the Used Car Trade.

In the July 10 issue of the Automobile Journal will be published the first article on used cars and the used car problem that will contain facts of a nature that will surprise those engaged in all branches of the industry, and demonstrate that anyone in any capacity, or any organization, or publication or publications, that are party to such a proposition or procedure, will jeopardize the whole future of the manufacturing and selling of passenger vehicles.

It is one surprising fact that any rule that would tie down legitimate business to the extent of 80 per cent. of its volume should be allowed to run amuck, practically unchallenged, in so important a phase of commerce as the automobile trade for 24 hours, let alone a period of months. Let it not be considered that the vital interests of dealer and manufacturer alone are affected. Every owner of an automobile is vitally concerned, for the market value of the car he is using is attacked every time some other automobile user bows to the arbitrary price plan and makes an exchange that ties himself and his fellow hand and foot. And there are eight exchanges for every 10 new cars marketed, according to actual estimates submitted by the highest commercial authorities.

Depreciation Differences Too Great.

No two cars depreciate equally. Too much depends upon the use they have had, the care they have had, what still remains in them for service—especially in these days when new utilities for the motor car crop up over night. Instead of dodging the issue, it is plain to be seen that with sound business principles only put into the used car transactions the new car business will, as it ought, proceed smoothly on its own base.

General Protest Immediate Need.

We object to a fixed price on a certain make of car of a certain year because it is against the best interest of new car owners and used car owners; because it smothers the dealer and repairer and handicaps the manufacturer.

There is no doubt that this many sided problem is one of the biggest confronting makers, owners and the trade in general today. Comments and suggestions from manufacturers, car dealers and owners are invited.

BUSINESS INSTINCT REFUSES TO BE DOWNED BY RULE

Relating How Mr. Customer Succeeded in Getting Genuine Value For His Well-Conditioned 1914 Car When a Set Price Was Against Him

THE used car problem, one of the most difficult of solution that now confronts the owner and the dealer, has set itself upon the automobile trade like an incubus, inasmuch as it hampers business through reason of being so impossible of adjustment.

That it works both ways to prevent the consummation of a trade is illustrated by the following conversation recently overheard in one of the salesrooms in a large city:

"Good morning, Mr. Customer," said the auto dealer as the prospect alighted from his 1914 Indefatigable.

All alert with the hopes of driving a good bargain, the prospect grasped the dealer's hand warmly, and the latter exhibited a similar affectionate feeling—it being apparent from that moment on that Greek had met Greek and the trade was going to a case of dog eat dog.

So Begins the Opening up of a Trade.

"Well I came down to get a new Gosum 1918 model and want to put the Indefatigable down as the first payment on it," said the prospect. He beamed cheerfully, casting an appreciative glance at his old steed, at the same time that the dealer looked askance with a depreciating leer at the self-same model.

"That's what I am here for," said the dealer, "and I don't believe you can get another car that will give you as much satisfaction and service for \$1000 even if you built your own factory and made every part by hand. No, sir, the Gosum is the only all around, medium priced car, and I'll lay a bet that it will take any hill on high in this neighborhood and that you won't have to dig the other fellow's dust from your eyes when out on the boulevards."

There was more of this sort of stuff, and it had its effect upon the customer, but it was not of a nature to advance this tale exactly where it is headed.

"Yes, I have studied out the specifications on the Gosum and have been convinced of its worth for some time," responded the prospect. "In fact, I have been riding in my friend Smith's Gosum and found that it filled all the kinks to perfection, so decided before I came in that I had settled on owning one, the only question remaining open, being the question of allowance for the 'bus' out there at the curb."

Price Standardization Makes Appearance.

"Well, that won't bother us much in the deal I guess," the dealer interrupted. "You know we now have a standard price which is allowed for the Indefatigable 1914 model and it is the same all over the country. Every dealer makes the same allowance on it; just \$250, leaving a little balance of \$750, which you can hand me a check for and take this new model right off the floor." This cheery declaration caused the automobile owner to drop his jaw and gasp, "nothing doing on any

such proposition as that!" As he surveyed with satisfaction the glistening sides and shining trimmings of the car that he had so carefully groomed for the past three years, a hot streak ran up his back bone. It ran off his tongue dripping fire and hot sparks. "You've got some nerve to make an offer like that for a car that cost \$1200 and is in as good condition as if it had been only driven six months."

"Can't help that," replied the dealer, "the list that we have all agreed to, says that the Indefatigable 1914 model is worth \$250, no more or no less, and we have to abide by that price."

"You don't mean to say that the condition of the car has nothing to do with its value," piped the prospect in high tones as he beckoned the dealer to step out to the curb where his car stood. "See the finish on that car," was his next remark as he warmed up some more, "why that is as good as new. Was only put on there last spring and look at all the nickel parts. Not a scratch or hole in the plating anywhere."

Jumping onto the running board and jouncing the car up and down and swaying it back and forth, the prospect, now

in a superheated state, ejaculated, "Did you ever see any better spring action than that? Kept them lubricated ever since I got it."

He next shook each wheel, demonstrating the absence of any play in the bearings, and then tried the steering wheel to show that there was no play in that. In the meantime the dealer stood by with the look of a stoic on his face and after mumbling an admission each time the prospect demonstrated a new point, was inclined to believe that the car was really



CHAPTER I—Mr. Customer Meets a Set Price Snag.

worth more than he was supposed to allow for it, but being a sticker for form he decided to hold out, and said:

"No use showing me its points, Mr. Customer," he said, "I will have to stand firm on that offer. You see there is little margin in the trade and I will have to go out and sell your car after I take it in."

"Well—I have been in the machinery business for 20 years," said the customer, "and have never heard of any such business logic as that. You mean that a 1914 Indefatigable, red, white or blue, wabby or staunch, weather cracked or sleek, sound or rotten, is worth just \$250 in trade—no more or less as long as it will run."

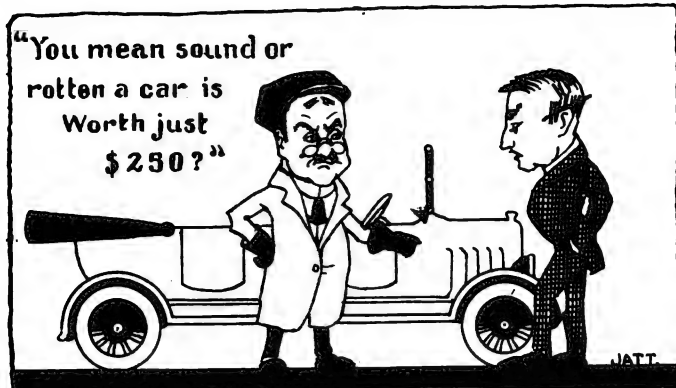
"That's the thing in a nutshell," said the dealer, "but it's the only way we can handle this trading game."

A Trial of What Competition Will Do.

"I think I can beat that with some of the other dealers and believe I can get about \$400 for this boat. The \$150 is worth looking after and makes it worth trying. Anyway, if I don't I can come back again."

As he placed his foot on the self-starter and threw her in, he called out, "I'll see you later."

It is easy enough to surmise what happened in the interim before Mr. Customer again appeared at the store of the Gosum dealer. Knowing him to be a successful business man we are not surprised to learn that he did some quick thinking. Having several friends who drove Indefatigable models of the vintage 1914, he immediately approached one whose car had been driven night and day every since he had



CHAPTER II—He Makes Sure to Get a Clear Statement.

owned it and which had suffered also from neglect. Said owner was painfully aware of the condition of his boat, but had become greatly attached to the make through becoming familiar with all its working parts and feeling it out for so many long spins over the roads.

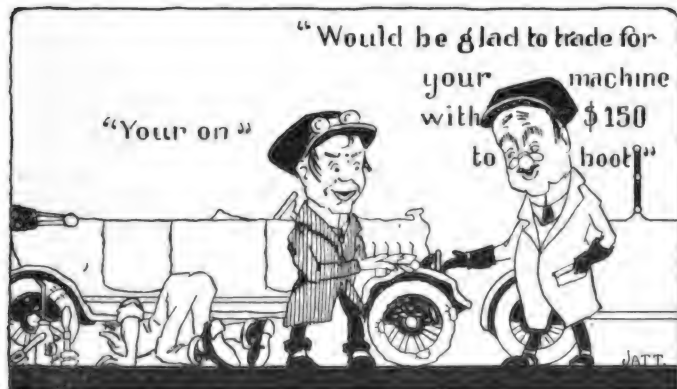
Picking Up a Car to Fill the Bill.

When Mr. Customer approached him and said that he thought he would like to get rid of his Indefatigable and would gladly trade it for the dilapidated machine if his friend would give a boot of \$150, there was little delay in consummating the transaction. The practised eye of the man who had driven so much was quick to appreciate the condition of Mr. Customer's car and the boot of \$150 looked small when he thought of what it would cost to put his car in the same shape, if it could be done at all for any price. He paid Mr. Customer \$150 and passed over his almost worn out machine at the same time.

In the second scene of this tragedy of business, Mr. Customer is found again front of the Gosum agency, tenderly fondling his \$150 and wearing a broad smile. As he drew up at the curb the car slid about 10 feet past the door, owing to the worn out condition of the brakes, but that only served to increase his glee, as he thought of the noble stroke of business he was about to engineer.

Greek Returns to Deal with Greek.

Stepping into the salesrooms he approached the Gosum dealer, saying, "Well, I came back and want to take the new Gosum away with me."



CHAPTER IV—Discovers an Easy Trade on the Curb.

"That's business," said the dealer, "have you got the old car with you?"

"Yes, the old car is out there," said Mr. Customer, with special emphasis on the old, which inflection was overlooked by the dealer, who was congratulating himself on the prospect of a quick and easy sale.

There was a change in the atmosphere, however, when

the dealer stepped from the door and rested his eyes on the car, as, in place of the nicely finished, neat looking, well kept machine that had formerly been the object of his dicking, there now stood a machine that might have been taken for the vintage of 1776 if its external appearance was the criterion.

"That isn't the car you had here the other day," he said,



CHAPTER III—Better No Deal Than a Poor Deal.

in a rather uncertain manner.

Closing Up on Terms Stated.

"I know it isn't," said the prospect, but, nevertheless, it is an Indefatigable model 1914. Now, taking your own word for it, its value is \$250 and I am ready to turn it in for that sum and give you this check for the \$750 and drop over home in the Gosum."

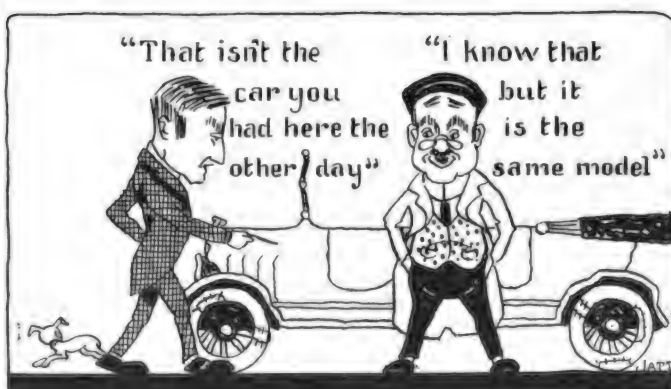
"Will it run?" squeaked the dealer in a dejected tone.

"O, yes, she'll all right. Body, wheels, engine, tires, springs and frame are all there and it never balks on the road. Can't find one thing wrong with the boat, but she seems some the worse for age."

"Give me the check," was the dealer's only reply as he walked into his salesroom, thinking how much better a bargain he would have struck had he allowed \$300 or even \$350 for the Indefatigable that was in presentable shape than the old boat he had now come into possession of. An agreement, however, was an agreement, and he felt justified in his action by so consoling himself.

The old boat cost about \$50 to put in shape and he felt fortunate when he got \$200 for it, while the other Indefatigable was advertised about the same time in the open market for sale and brought its owner \$500.

The owner of the new Gosum pondered over his dickerings and wondered how a business man such as the dealer could defy the fundamental laws of business as though he had the power to make water run up hill or forbid the sun to shine. He was also reminded of the inexorable law of busi-



CHAPTER V—Fulfilling Requirements—But Oh! What a Car!

ness that supply and demand must ultimately control the price of anything having worth and value.

As the dealer, likewise, philosophized over the transaction he was inclined toward the opinion that the market for rolling vehicles is not bounded by four walls and that, maintaining a set price for a car offered in exchange was rather incompatible with other business rules in vogue in the trade.



Sketch of Military Highway Around the Borders of the United States Proposed in the Bill Introduced in Congress by Senator Chamberlain.

THE BIG PATH FOR FREEDOM'S DEFENDERS

How the Automobile Helps to Protect and Conserve the Most Wonderful Country on Earth in Its Greatest Crisis

WITHIN the protecting loop of a Marginal Military Highway, such as is now proposed to Congress, with the sanction of the American Automobile Association and other large and influential bodies, is located one of the largest, without a doubt the busiest and richest nation on earth. Of all the road proposals, which are legion, the marginal road appeals to the sober sense of the American people. It has interests to defend which stagger the mind to unfold.

For within the loop of the proposed marginal highway that may some day be built around Uncle Sam's door yard, there are 100,000,000 people, owners of, custodians of and users of billions of dollars in money and property. A million dollars is a staggering amount of money; a billion dollars is a thousand million dollars, but the era is at hand when one must get accustomed to thinking in billions.

The Wealth of the People.

The people of the United States have eight billion dollars on deposit in the national banks.

They have four billion dollars additional in the savings banks. The assets of the building and loan societies in this country amount to a billion and four hundred and eighty-four million dollars. They have just invested two billion dollars in the biggest Liberty Loan that was ever floated.

The farms in the United States are valued at forty billion dollars at a low valuation. The value of farm products is ten billion dollars.

The value of manufacturing products is twenty billion dollars. The automobile industry now ranks in second place as regards the value of manufactured products. The people pertinaciously hold the automobile no longer a luxury, but rather a business and almost a home necessity. Today there are in use more than three million five hundred thousand motor cars

(N. A. C. C. statement), whose value exceeds two and one-half billions of dollars.

Earnings Go to Enormous Figures.

There is more, much more, within the confines of Uncle Sam's proposed military highway. There are, for instance, the millions of busy workers, who earned billions of dollars in 1916; whose earning under the war's increases this year will be much higher. To get some idea of it let us make an estimate of the earnings from these facts:

4,900,000 persons earn between \$900 and \$1200 per year.
1,500,000 persons earn between \$2000 and \$2999 per year.
900,000 persons earn between \$3000 and \$4999 per year.
420,000 persons earn between \$5000 and \$9999 per year.

Truly there is something very large and valuable worth protecting with a marginal military highway and other modes of defense. Wealth production in 1916 furnishes very interesting figures.

Railroad earnings for 1915 were.....	\$1,856,900,000
Railroad earnings for 1916 were.....	2,214,000,000
Value of farm products 1915 was.....	10,775,000,000
Value of farm products 1916 was.....	13,449,000,000
Bank clearings for 1915 were.....	186,580,000,000
Bank clearings for 1916 were.....	259,574,000,000
Savings bank deposits for 1916 were.....	5,195,400,000
Exports for 1915 were.....	3,195,400,000
Exports for 1916 were.....	4,961,200,000
Excess of exports over imports in 1916.....	1,765,800,000
Stockholders of the United States in 1916 received dividends amounting to.....	966,927,965

The Market Place of the World.

During the next few years America will be the market place of the world. American factories will be going at full blast, as they are now, only more so. It is America's duty to



Breaking the Wide Western Prairie with Team of Four Plows Economical in Light Soils.

clothe, feed and stock the world in general with all that is needed to carry on this great war and reconstruct the nations of the earth after the war. America must be the warehouse of the world. American mines must be worked night and day and American fields cultivated to the maximum. Through it all the truck, tractor and trailer will be the mainstays of land haulage, the passenger car and express delivery busy every minute and speeding hither and thither on all sorts of errands of business, necessity, yes, and for that relaxative recreation which will be necessary even in the midst of the mightiest, sincerest works ever undertaken for the good of humanity at large.

While preparing for the South American market, far off Africa and India, and while struggling, too, to supply and sustain our military Allies in Europe, the seat of the great war, the needs, necessities and the profits in the home market deserve marked, thoughtful, efficient, businesslike attention.

Without a doubt the prime automobile market in the country today is that section of the eastern seaboard where thousands of busy industries are found running at top notch capacity. In New England and the eastern coastal states, including New York, New Jersey, Pennsylvania, Delaware and Maryland, the densest in population, where so great a portion of the war revenue is being raised, is also the territory where so great a share of the same will be passed out again by the government in payment for war contracts, and into circulation in the form of wages. This section contains, on the face of reliable statistics, over 30 per cent. of the population of the United States, shows, too, over 30 per cent. of the neighborhood of 3,750,000 automobile owners of the land, and over 30 per cent. of the dealers in automobiles who, according to the National Automobile Chamber of Commerce, aggregate 25,924 in the land, while other equally reliable estimations place the number of dealers this year as conservatively over 30,000.

munition, uniforms, blankets and shoes, it leads the entire country. It is peopled with generations of skilled craftsmen, who are the richest per capita in the country, if not in the entire world. Capital is thoroughly and completely associated with the industries and the machinery equipment and tools of production are unequaled anywhere in the country.



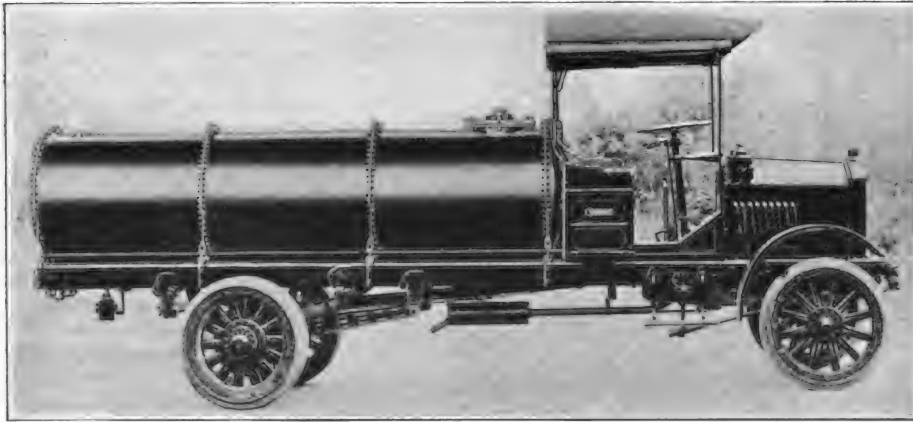
Turning Sod with a Kerosene Burning Tractor Working with a Gang of Three Plows.

The enormous buying power of the section is only partially recognized and probably tremendously underestimated. All the while this same section is furnishing its full quota of men and arms and funds for the prosecution of the war and abounding zeal in every form of service which the extraordinary times call for, it is absorbing immense stocks of commodities which enter into the great task of keeping this enormous industrial and domestic fabrication going, such as automobiles, accessories and the like.

On minute analysis it is found that practically one car in every three that has been sold in the United States in the past five years has been sold in the eastern territory covered by these 11 states. With several hundred thousand in excess of a million car owners in this same territory, so thoroughly grounded in automobile use that they constitute an



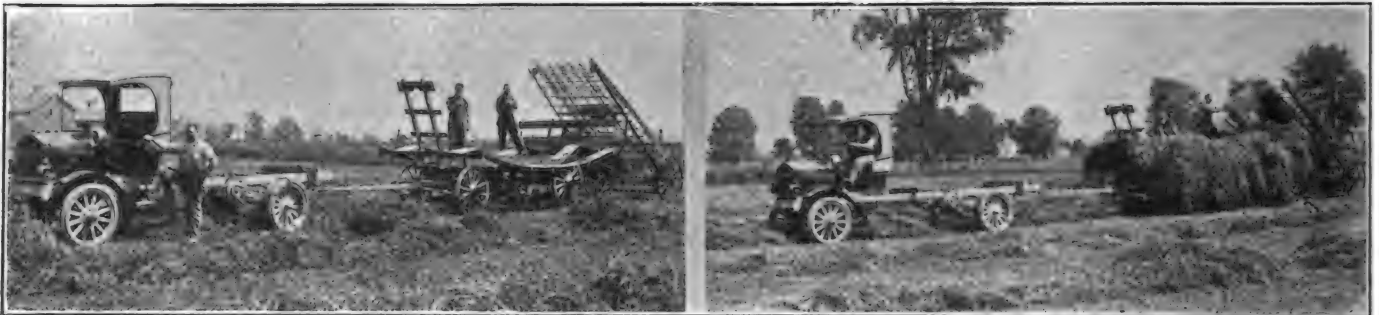
Even Furrows Laid Down by Gas Tractor Pulling Three 14-Inch Power Lift Plows.



When the Country Is Bone Dry More of These Three-Compartment Water Tanks Will Be Met on the Roads.

enormous rebuying class, the proportion is carried out with faultless mathematical and logical exactness. The assumption is entirely justified that the same proportion of accessories sold have been bought by residents of this section. The same states also have the highest percentage of improved

every minute in even such short trips as from the home to the workshop, the counting house to the bank or the board meeting, will be extended more widely in every line of business and ride of life. Walking is swift, but it is inefficient and takes too much time away from the seriousness of daily pur-



The Old Fashioned Hay Rigging Still Is Met, with Mechanical Draft at One End and a Mechanical Hay Loader at the Other, Taking in the Store of Fodder for Dairy Animals and Horses on a Michigan Farm.

highways in the country, a fact which has been mainly instrumental in making them the leading automobile buying states of the Union.

Every year the United States digs from the ground a billion dollars worth of metallic minerals and over two billion

suits. This is no calico and wooden shoe country and never will be. The people invest their earnings in automobiles for the sake of getting a valuable return, and they get it.

The people of this country invest in life insurance to the extent of over \$30,000,000,000. They are spenders—usually for a sound and sane purpose. Property in this country is protected by \$3,000,000,000 worth of fire insurance.

There are \$6,000,000,000 worth of farm animals in this country. There are \$2,000,000,000 worth of horses in the United States, \$2,500,000,000 worth of cows and other cattle.

As for the food resources of this country, we could be walled in and sealed up indefinitely and still have a surplus. The uncultivated farm lands of the United States, if put under cultivation, would feed England and France year in and year out.

Put a military highway around all this. That is the proposition of the bill introduced by Senator Chamberlain. Nature gives us abundance to surround and protect. Most wonderful of all countries on earth is the United States. Back of man's manufactures, back of human activity, the thing that makes the United States the marvel of the world, the banker of the universe, the hope of the Allies, the victor in the great war, the one country of all countries worth living in, is the abundance that nature has



A Good Road and a Wide Road for Fleets of Passenger Cars and Truck Trains.

poured into our laps. Recall that in 14 commodities most essential to life, doubly essential to winning the war, the United States leads the world, and these are:

Corn,
Wheat,
Oats,
Cotton,
Tobacco,
Cattle,
Coal,

Petroleum,
Pig iron,
Steel,
Copper,
Aluminum,
Zinc,
Silver.

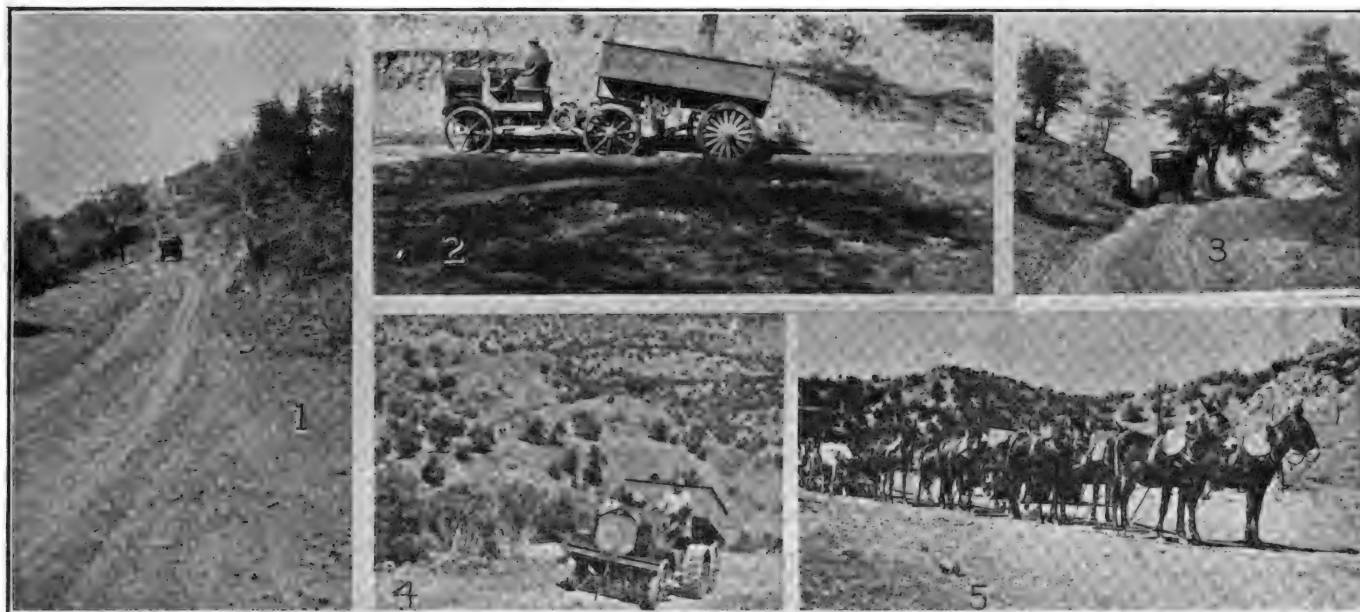
It is no wonder at all that the immediate destiny of this country is the most exceptional sort of activity and prosperity. All these 14 products are needed by the world, the world must have them, and the United States not only must produce them, but can and will, by earnest work of loyal citizens and the aid of the automobile, produce them.

Under full martial conditions, therefore, with the country arrayed completely in the panoply of war, the farmer, the soldier of the soil, drives his new artillery plows and puts



Passing Through Cleveland, O., These Express Trucks May Be Seen Making Deliveries of Meat.

engaged in mobilizing "soldiers for the soil." They have headquarters opened in all the large cities of the East. The signs over the door urge every one who can volunteer to do so, and to go on the farms, help to raise and harvest the crops.



Arizona Mining Operations with Tractor Aids: 1, "Jigger Hill," a Long, Winding Grade, at Times Exceeding 20 Per Cent.; 2, Crossing One of 64 Fords at Three Different Creeks, in 18 Miles; 3, Tractor Near Top of "Rocky Hill" Ascent, Duquesne Mining and Reduction Company Trail; 4, Starting 20 Per Cent. Grade Climb; 5, 10-Mule Team and Wagon Formerly Used on Mine Hauls.

through an immensely greater part of his campaign with reliance on his automobile and motor equipment than those who place their dependence on him for food would think. Far inland the soldiers of the soil toil in seed time and harvest, leaving it to the defenders of the national army to run their military highway completely around the land to protect him at his task. A survey of the present situation is immediately convincing that the automobile is a necessary part of the present plan to increase production to the highest possible degree. Through many years the automobile has been advancing to take its place as a necessary mode of transportation and an effective means of arriving at quick results in the food production program.

The Salvation Army, as a constructive force, has for several weeks been



Truck and Trailer Transporting 10-Ton Loads of Dolomite Over Roads in California.



Discing and harrowing a field in order to prepare the ground for seeding.

It is especially significant that the large, high powered automobile is kept at the front door of the "Soldiers of the Soil" headquarters. This car takes the farmers on their way back to the land and fulfills many other duties connected with the movement.

Automobiles Engaged Everywhere.

The public is pertinacious in its opinion that the automobile is an essential element in the transportation system of modern life. Events of the past two years and every passing day confirm this idea. The railroads have failed more than once in the movement of necessities, and now, with war on the government's hands, the burden on them is even greater. There is little use stopping to consider the things that have brought about this condition. It is a staring fact which confronts the nation, and letting the railroads work their way as best they may, they place their dependence on the motor cars — light and heavy — to move what must be

moved anywhere and any place. Motor touring is increasing as the season advances through the simple fact that the means of locomotion within the control of the traveler is capable of reliance. The automobile takes the owner where he wants to go, when he wants to go and with all that variety of detour which whim or fancy may dictate at any time or place. Good roads is all the motorist asks.

Boom to Road Building.

Road building in certain sections of the country will receive greater impetus if the military marginal highway bill is passed by Congress than otherwise would result in many years of highway construction under normal requirements and conditions.

The military marginal highway bill authorizes the secretary of war to direct the chief engineers of the War Department to prepare a comprehensive plan of improved highways throughout the United States, designed, primarily, with a view to facilitating the movement of military troops, equipment, munitions and supplies, in time of peace and in time of war, but, so far as reasonably compatible with said primary purposes, with a further view to accommodating the postal service, facilitating interstate and foreign commerce, aiding agriculture and manufacturing pursuits, and promoting the general welfare of the people of the United States.

The principal feature of the bill, however, is the provision for the "marginal highway" as the name suggests, which is outlined as follows:

"A continuous main national highway to be constructed and maintained at the national expense along or near the Atlantic seaboard; thence along or near the southernmost boundaries of the United States, and thence along or near the Pacific coast to a point at or near the Canadian line, with a further view to such marginal highway being extended ultimately along the Canadian boundary of the United States.

Supplementary Radial Roads Planned.

After this great marginal highway, some 12,000 miles in length, had been completed or partially so, provision is also made for a supplementary plan of main radial roads intersecting it "at points and of locations and routes best calculated to best serve military requirements." These radial highways are to be such as have heretofore been constructed by the states, or as may hereafter be constructed by them independently or with Federal aid.

On the marginal highway, however, the officials will keep in mind the fact that for military usages the roads will have to be of a specially heavy and solid construction to stand the strain and abuse occasioned by the passage of long trains of heavily laden motor trucks and tractors pulling enormous field pieces, weighing up to 100 tons or more.

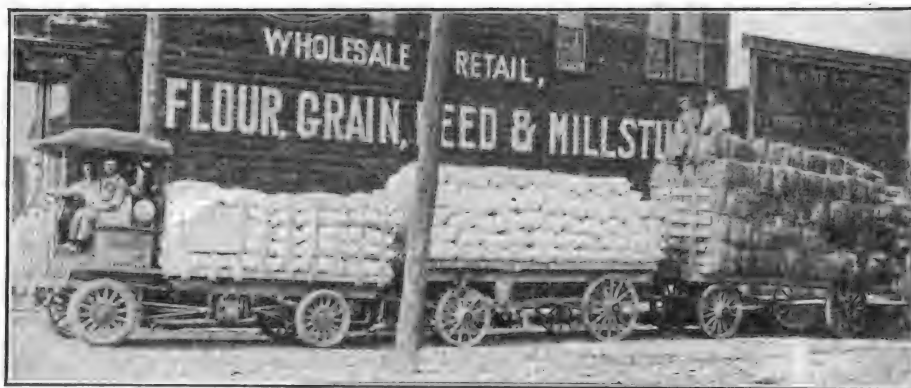
With the motor car and tractor rapidly succeeding the horse and mule as a means of transportation and locomotion in the army, the question of good roads assumes a position of premier importance and it is believed that it will take but little persuasion to make Congress take this view of the matter when it comes to a vote.

When our great army is trained and mobilized in France it will be a wonderfully effective unit, as the roads throughout that country are of the most perfect type, particularly in

the various theatres of war. So an excellent road system will be needed to hold up its efficiency when the national army is mobilized here.

The United States with this marginal highway constructed, and a comprehensive system of intersecting roads leading into it at many points, when taken in conjunction with the several million automobiles at the

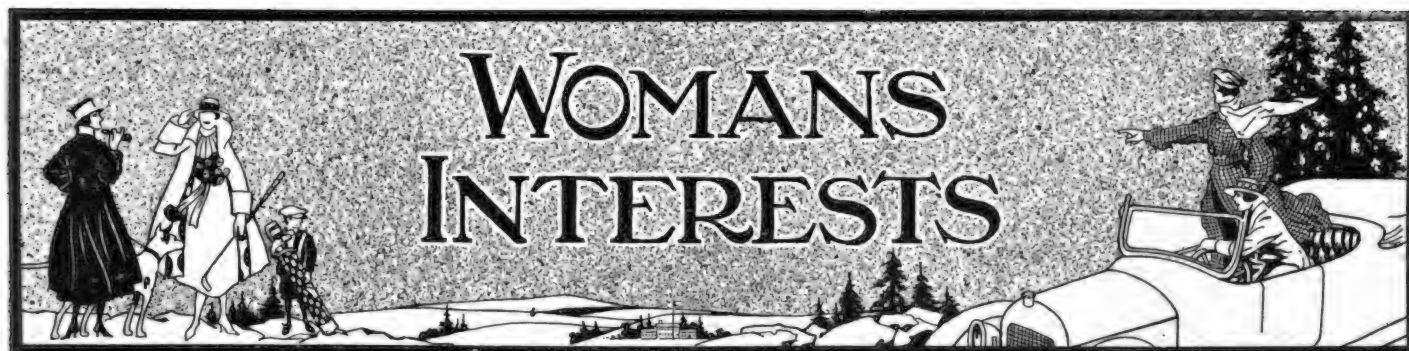
government's disposal and the fleet of 100,000 aeroplanes that is proposed, would be the most powerful nation in all the world from a defensive viewpoint. It would place the country for all time—if maintained—in an invulnerable position in so far as any other nation is at present prepared. The construction of this road by army engineers while the national army is in course of formation would be a good outlet for the constructive activities of thousands of men drilling for war.



This scene in Northern Michigan shows heavy haulage by truck and trailers of provender for man and beast.



Another use for the tractor is as a stationary power plant, cutting ensilage for a silo.



SISTERS OF FREE AMERICA LEARN TO DRIVE

How Boston Public Safety Committee Trains Willing Students to be Automobile Operators, Under the Guidance of Jackson Captains



Systematic Instruction of Women in How to Drive Carried on by Jackson Motor Car Company Officials in Boston.

IN BYGONE days the accepted war time tradition was that men must fight and women must weep. But in this day and age the highest civilization has proved that woman has her definite place and task as a factor in national defense. Not only does she have this place, but she is practically and efficiently filling it. There is nothing strange, therefore, in the fact that the women of the nation turn their hands to service of all kinds and especially in motordom. Secretary of the Interior Lane himself told the federated clubs that moving the nation's traffic quickly was one of the highest in war time service. This meant, undoubtedly, traffic of all sorts—on the streets and roads as well as on the railroads.

There is nothing demeaning or unwomanly in the purpose of women who have undertaken to drive cars and study automobile mechanism and its operation. There are innumerable traffic services in which they will be able to help Uncle Sam, both now and later. It is inspiring and ennobling to see women serving as strong Minervas, and not huddling through fear as weeping Rachels.

Where is this going on? In every city, town and hamlet of the country practi-

cally. Here and there, in the busy cities, or by open highways, it is possible to get a glimpse at them in the act of mastering the motor car. From the time of the entrance of the United States into the war motoring women have been unusually active in Boston. A company of women motor drivers was organized and still more was found for these workers to do.

If one is motoring along Commonwealth avenue and in the vicinity of the Chestnut Hill reservoir, in Boston, these days, one may see earnest women patiently studying the problems of motor car operation and care. The sight is not only interesting in itself, but one emblematical of women's highest, patriotic devotion in the defense of Free America. One may see a Jackson Eight car with No. 0349A rolling around with

a young woman at the wheel. Or the car may be stopped and she will be bending over the motor or the tires. She is learning to be of service to Uncle Sam in a highly practical and useful way. And her motoring education is not costing her anything for tuition.

When war was declared there was great need of motor cars for public service. The dealers filled these demands first, as they always do. Then private owners responded to public appeals. However, it was found that many owners had no drivers and they could not give their own time to the service. In other words, they had cars to offer but could not supply drivers.

With realization of the patriotic spirit among men and women to be of real service to the country, a practical system was conceived by Alfred H. Sowers, treasurer of the Jackson Motor Car Company, and it is now in operation with excellent results. It was based on the belief that women might be taught to drive and a car that would without a driver be unserviceable be made available for defense and safety. He explained the plan to Chester I. Campbell, who was then chairman of the motor truck and pleasure car committee of the Massachusetts Committee of Public



Teaching Woman Student Driver How to Remove a Tire.



Studying Motor Mechanism.

Safety, suggesting that if car owners were willing members of their families or others should drive the machines he would arrange to give driving lessons free to women who might volunteer for this service. Mr. Campbell arranged to have applicants recommended by his committee trained under Mr. Sowers' direction.

When the plan was known the patriotic Boston womanhood responded gladly and in a short time Mr. Campbell received applications from a number of women anxious to receive lessons. Some of those applying had been to motor schools and had been turned away disappointed, in the regular schools there was such a rush that those volunteering could not be accommodated. So they were sent to Mr. Sowers. At first Mr. McKee, his retail sales manager, instructed the young women. The applications came so fast that instruction would, if given as desired, take all of Mr. McKee's time every day in the week. Therefore Mr. Sowers had to devise a plan that would not interfere too much with his usual avocation.

Albert Fitzsimmons, one of the Jackson demonstrators, was assigned to the work in conjunction with Mr. McKee. The plan was systematized by having the names of the applicants listed, with their addresses and telephone numbers. Then the students are given some idea of the day on which they would get a summons. In the course of the instruction they receive much more training than just being taught to drive. They are instructed how to make changes with different types of tires, how to determine ordinary causes of engine failure and the restoration or repair needed and how to use wrenches, jacks and other tools, as well as make magneto and carburetor adjustments.

In carrying out this plan of tuition the applicants are listed by zones. When they are called out on the road to receive their lessons those in Boston getting their instruction from Mr. Fitzsimmons, Mr. McKee takes out others who live in the suburbs. If he is going out on a sale to a nearby town he arranges

that some who live in places nearby are taken along on the demonstration. After the demonstration he gives some time to the students, teaching each one.

Each of the applicants is required to pledge herself that when proficient she will be available for such service as the committee of public safety may elect as a driver of a car. The applicants are only too eager to do so. Many new drivers are furnished constantly by this system.

Mr. Sowers hopes that the Boston Automobile Dealers' Association will take up the work so the applicants can be divided among them. This, it is understood, may be done later if the total keeps growing. There is now on the waiting list more than 75 who are anxious to learn how to drive cars. The ultimate cost to Mr. Sowers in time, gasoline, oil, tires, etc., will run up considerably into dollars, but he is doing it as his share of a patriotic work.

The training given to the women applicants under this plan is well nigh inestimable. Such success as has attended it will, it is hoped, lead to emulation in other cities. It is easily seen that in order to be effective the training must be thorough and it is not without some effort that the co-operation of large-minded, public-spirited men can be attracted to this work. Women who are given a solid basis of instruction in the handling of a car acquit themselves in driving with great credit. They display,

as a rule, a high degree of road intelligence, and in the times that are ahead it is hard to tell just how far it will be necessary to call upon their services.

The start that has been made by the women of Boston through the opportunity which has been opened to them is, however, a most pleasing indication of what may be expected when the demand for women drivers is more generally realized.

The recruitment of women drivers to the public safety fleet has been a big help to those conducting this volunteer state defense service. From the first the shortage of drivers has been a big problem. In registering vehicles the committee used a red card, the blank form including a line that a driver would or would not be supplied. The plan of the committee divided the vehicles offered voluntarily by their owners into three classes, A, B and C, the first consisting of motor trucks that would be ready at six hours' notice for use for one day of 12 hours, the second motor trucks that would be ready at 48 hours' notice for 30 working days, and the third touring cars and runabouts that would be ready at six hours' notice for three working days. The committee has issued an insignia that is attached to the cars, which designates them as registered for the service of the committee. Up to the present time the committee has furnished several hundred cars for various purposes, many of them being in charge of women drivers, and has a constantly dependable service.

AMERICAN CAR FIRST IN FRANCE

Patriotic Women Send an Automobile on Mission Through Art Ruins of War

"Somewhere on the Atlantic" is an American motor car which, when it is safely docked from the liner carrying it, will be the first American pleasure car to enter France since the beginning of the war. The entry will be by special permission of the French government, secured through the influence of art loving and patriotic women.

It will be used in France in motion picture work when the art ruins of the war, including the Rheims, Soisson and Ypres cathedrals, will be photographed under the direction of the great sculptor, Rodin. The pictures will later be shown in this country for the benefit of the Committee for American Aid for the Restoration of French Monuments of Art, of which Mrs. Cecelia Sartoris, grand daughter of General U. S. Grant, is the American representative. The committee itself has a list of notable members, including Theodore Roosevelt, Jules Jusserand, Robert Bacon, Myron T. Herrick and Cardinal Gibbons.

The car, a Dodge Brothers convertible sedan, containing its owner, the Comtesse Regina de Regis de Olivera, is shown before the statue of Joan of Arc on Riverside Drive, New York.

Since the great French government lends its aid so willingly to this quiet, effective war enterprise, it is apparent that woman's service is recognized in other ways than the driving of cars.



Comtesse de R. de Olivera in Car.



Serviceable Togs for the Summer Motor Woman

By MRS. A. SHERMAN HITCHCOCK.

WE HAVE all seen some motor clothes—so-called—that pose, but none of motor togs herewith illustrated are of that kind. They belong to the realm of real motor land; the kind of motor land that means delightful tours and spins, driving your own car and taking care of it, too; and nowadays, with the motors of mechanical perfection, even that is play of a kind. Motoring clothes that pose are the picturesque and conspicuous garments that we see at the beaches and smart restaurants on women who would be exhausted after a few hours at the wheel, and would faint or have apoplexy if they were asked to repair a puncture.

Fortunately for the woman who loves motoring in the real sense of the word and who loves also to present an attractive appearance, very suitable and becoming raiment is provided.

Costume for Working on the Car.

It was in Europe first, where women have bravely come forward to fill places in factories, fields and other activities, vacated by men who were called to the colors, that the overall costume was first introduced, but it did not take the designer of motoring raiment long to determine that there was a place in the wardrobe of every motor woman for a modest, comfortable and practical overall cos-

Key to Illustrations

MODEL AT LEFT—Showing how gingham is used for motor frocks; in green, tan, pink or blue colorings, with embroidered batiste collars and cuffs. Courtesy Franklin Simon & Co., New York City.

MODEL IN CENTRE—Demonstrating fashionable La Jerz material. Embroidery, this season, is a highly decorative adjunct of motor coats and fancy silk linings are also used.

GLOVES—Newest gauntlets, with palms of kid and backs of silk. Illustrations courtesy of R. E. Bradford, Gloversville, N. Y.

MODEL AT RIGHT—Overalls of white drill, with waist and pockets trimmed with bands of blue, for the woman who cares for her own car. Courtesy Franklin Simon & Co., New York City.

tume. The woman who enjoys puttering around her garage and doing the little necessary things about her car will find that, with the elimination of skirts, less physical effort and strength is required and the fear of soiling or tearing a frock is no longer with her.

The picture shown is of white drill, a most serviceable material, which launders perfectly, with bands of plain blue on the waist and pockets. The trousers are full and gather into narrow elastics at the ankles; the plaits at the belt give sufficient fullness without bulkiness and the pockets are very convenient. There is the waist big with "galluses" like a man's overall and the garment is slipped on over the shirtwaist. When the motorist comes in from the garage the overall may be removed and her sport skirt donned with the shirtwaist and in a jiffy she is ready to motor to the Country Club or for a spin to the country.

New Grecian Lines for Fall.

One of the best houses puts out a motor frock of navy blue moon-glo satin, made on the new Grecian lines, which are very advanced, but which will be used greatly this coming fall. The modish silhouette is straight and the moon-glo meteor, crepe and satin have been manufactured expressly to meet the demand for draped effects that will be in vogue this coming season.

One cannot say enough in favor of these exquisite materials; delightfully soft and beautiful in appearance; their durability is exceptional. Although they are not made with a satin surface, they



Classic Design by Bergdorf & Goodman,
New York City.

possess a peculiar bloom which can only be described by the word "Glo," and it is because of this that they have named it moon-glo. The colors are most delectable; to see them is to long for at least one gown and the shades are so lovely and so varied that it is a most difficult task for one to make her decision.

An Exclusive Motor Frock.

An exclusive and pretty motor frock of moon-glo meteor was shown at one of the best designers. The skirt was of navy blue, accordeon plaited and altogether straight. The waist was of lemon yellow and it was trimmed with black cords and buttons. The sleeves were very wide and fastened up their entire length with tiny black buttons. The skirt belt was placed very high and was a trifle lower at the back, a feature which many of the very modish frocks show. Another very smart frock was of beige moon-glo crepe, embroidered with squares of coral color, while still another was of moon-glo crepe, blue as some summer flower, and built on the Grecian lines something like the one shown in the illustration. Whatever the motorist may feel in doubt about she need have no hesitancy regarding moon-glo materials and Grecian lines if she wishes to be at the head of the fashionable procession.

Nobby Motor Gauntlets.

Smart gloves are highly essential to a distinctive and well groomed appearance and for the motor woman who likes "something different," something decidedly smart and unusually attractive, the line of gloves illustrated can be recommended. They are entirely new and only to be found in the smartest shops, and I have seen nothing like them or to

equal them in beauty of workmanship, style or fine quality. These gloves are all of the gauntlet type. The palm and inside part of the fingers is made of beautifully soft kid, while the outside of the hand is of a fine quality of silk. This makes the part of the glove very durable where the greater wear is encountered and also makes them decidedly cool and comfortable for summer wear, having the silk back. The gloves pictured at either end of the design are the last word in correct and elegant sports gloves. One pair is of chamois and silk, all in the yellow chamois color and of the most beautiful texture; the chamois is as soft as the silk and the gloves may be easily rolled and slipped in a small pocket of the coat or skirt. The other gloves come with a palm of white kid and silk back in all the sports colors, such as cerise, blue, green and yellow. The gloves in the centre with wrist straps are made of the softest of tan kid palms and silk backs of tan ornamented with heavy black stitching and wrist strap, which is adjustable to any wrist.

Gingham in Fashion's First Rank.

Gingham has been promoted to first rank of fashion this season and many of the smartest dressed motor women are wearing frocks of gingham, the patterns showing plaids, checks and stripes in pastel colorings. These frocks are

particularly fetching when a combination of gingham and chambray is used.

The design and workmanship is given all the care and attention possible. The checked gingham is combined with a plain color to match the color of the checks, and a collar and cuffs of white handkerchief linen, batiste, or organdy gives a very delightful finish. One especially excellent feature of these frocks is that they may be laundered repeatedly and preserve their original appearance.

Coat to Do Double Duty.

A charming coat that serves both for general street use and motoring wear is shown in the illustration. It is of the fashionable La Jerez material, with a choice of the smartest colors, including gray, beige, green and navy blue. The large rolling collar makes it an excellent motoring coat. The fullness is inserted in an unusual and attractive manner and the embroidery gives it an elegance of appearance which every motor woman admires.

The "cache-nez" collar is now accepted by all smart motorists. The cache-nez is a most convenient arrangement. It may be tucked away under the belt or buttoned to a rever or sleeve. The ends of the collar are very long and are finished with tassels or fringe and are worn crossed in front or at the back and are wound around the throat.

NATIONAL LEAGUE MOTOR CORPS

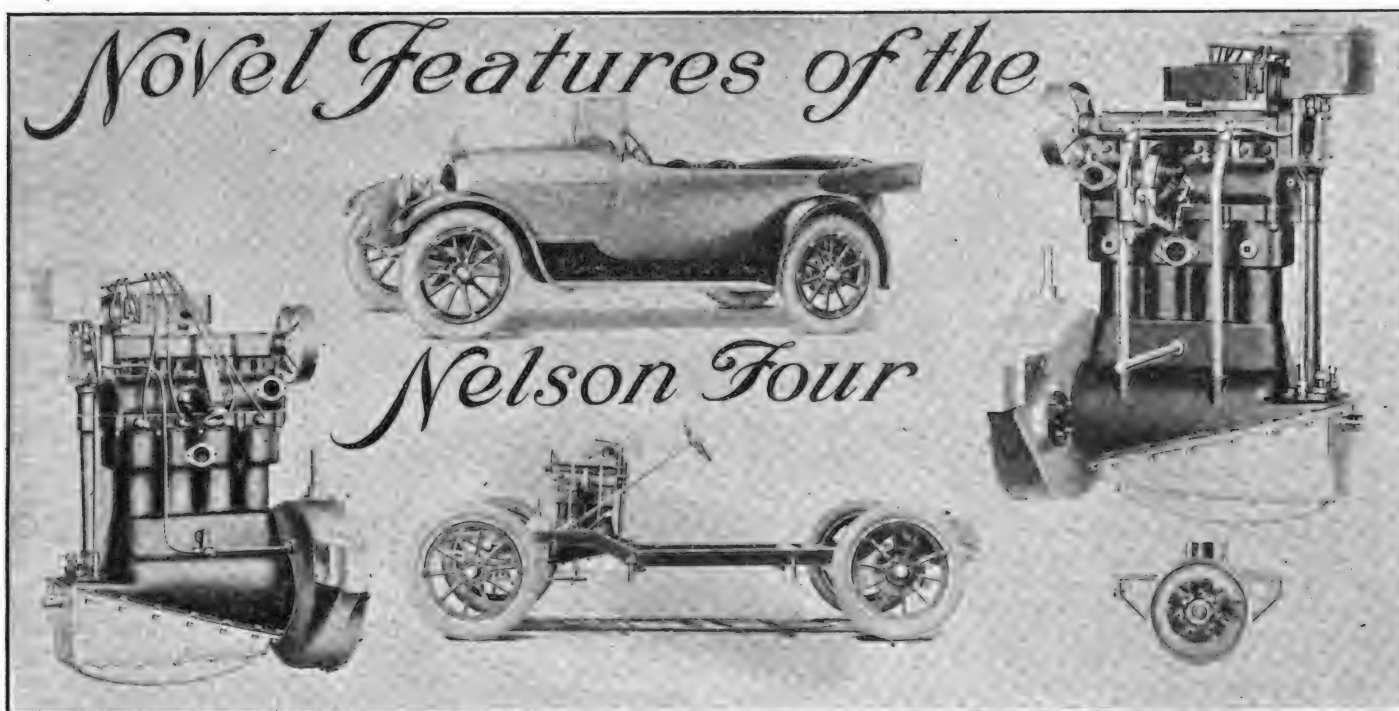


Certified Drivers of a Division of the National League for Women's Service in
Front of Headquarters, New York City.

THE National League for Women's Service, organized last January to co-ordinate and standardize the work of the women of America along lines of constructive patriotism, is training groups in every community to co-operate with the Red Cross and other agencies in dealing with any calamity. Mrs. Coffin Van Rensselaer of New York is the organization publicity manager.

Of the 11 national divisions into which the groups have been divided, the motor corps is one of the most interesting and efficient. The services performed by the

members of the division with their machines are very numerous. The member must meet a number of requirements for active service. She must have had at least two years' experience in driving and a certificate from a motor school; a health certificate and state's chauffeur's license. Infantry drill is compulsory and is held twice weekly. A course covering first aid is given once a week in a hospital. The members wear khaki uniforms, consisting of a short skirt, Norfolk coat and visored cap quite military in effect.



THE 1917 season, which is now drawing to a close, was notable as one in which but few new cars of radical design were introduced, but of these few none was so conspicuous for its mechanical features as the Nelson car brought out this spring by E. A. Nelson, mechanical engineer of Detroit, who designed the well known Hupmobile "20" runabout that was brought out in 1903-10-11-12 and the "32" model of that same make.

Developed by a modest corporation, headed by the engineer and designer himself, the Nelson car is being produced in considerable numbers for market. Outwardly it has the appearance of the standard type of touring car except for the engine hood and radiator, which, together, are cylindrical in form. The absence of a cowl is also noted, the hood joining the body lines under the windshield in a crescent sill.

Departures in the Chassis.

In the chassis, however, are found features quite extraordinary, particularly the engine, which is a four-cylinder, valve-in-head, $3\frac{1}{8} \times 4\frac{3}{4}$. The cylinders are cast en bloc of hard close grained iron, with the upper part of the crank case integral. The lower half of the case is of aluminum. The heads, which are detachable, carry the valve assembly and manifolds, another novel feature. The gray iron pistons have two twin locked piston rings each, and are dowel pinned to the piston, thus holding the slots at opposite points. The connecting rods are "I" beam, forged from carbon steel, the "I" being made shallow to give the maximum stiffness without an excessive amount of material. A high carbon steel forged crankshaft is used, counterweighted and hung on two bearings of extra large dimensions, at either end. These bearings have an anti-friction lining in a phosphor bronze bushing.

The valve drive is through a bevel gear

and vertical shaft from the crankshaft to the overhead camshaft. Back of the bevel gear, which is mounted on the rear end of the crankshaft and housed in the rear main bearing, is a spur gear, which forms the magneto drive. The magneto, a Bosch of special high-tension type, is located on the top of the engine.

Divergencies in Engine Members.

At the rear end of the camshaft, which is mounted in the head piece, is the spiral gear, through which it is driven, and at the forward end is the fan pulley, which drives the four-blade aeroplane fan. The camshaft carries the cams integral. The

per square inch with an exterior adjustable release. The oil is circulated to all bearings through the hollow crankshaft, making an auxiliary splash system unnecessary, while an independent lead to the camshaft housing keeps the camshaft bearings and valve tappets continually bathed in oil. Two quarts of oil are kept in reserve in a small tank mounted on the top of the engine, which can be fed into the main reservoir whenever the oil indicator shows no pressure.

Cooling is accomplished through a thermo-siphon system, with cellular radiator in which the overflow pipe is carried to the bottom, allowing the steam formed to thaw out any slushy ice that might form there in cold weather.

A Distinctive Carburetor.

A special Nelson-Zenith carburetor is used, with vertical flange directly against the cylinder head, which contains the integral manifold, which is so formed that the longest draw from the carburetor to the farthest intake port is four inches. Water about the cylinder head is kept at about boiling temperature summer and winter by use of a specially cast cylinder. Through a special throttle linkage a uniform opening of the throttle is possible in the low position.

The U. S. L. starting and lighting system is mounted on the front of the engine, operates directly on the crankshaft and takes the place of the flywheel. Pressure on the pedal starts the motor without any clashing of gears or driving mechanisms, which are eliminated. A U. S. L. storage battery is used with the system.

Notable Gasoline Mileage.

The makers claim an average of 25 to 30 miles per gallon of gasoline and a possible acceleration on high from five to 35 miles per hour in $13\frac{1}{4}$ seconds, although the engine develops but 15.5 horsepower S. A. E. rating. Oil consumption of one

DETAILS OF NELSON CHASSIS.

Cylinders.....	Four, en bloc
Bore and stroke.....	$3\frac{1}{8} \times 4\frac{3}{4}$
Clutch.....	Multiple disc
Gearset.....	Three speed
Electric system.....	U. S. L.
Chassis weight.....	1190 pounds
Springs.....	Special form
Wheelbase.....	104 inches
Tires.....	32x4
Touring car price.....	\$1700

cams are of the true constant acceleration type, designed to run with the very minimum of clearance and give quick opening and closing of the valve ports.

The valve tappets are hollow piston type and, together with the valve stems, which fit into them, are ground to finished accuracy, after which no adjustment is required.

Unusual Oiling Devices.

In the oiling mechanism are found a number of unusual applications, the lubrication being effected by the same gears that drive the vertical shaft and give a pressure running up to 30 pounds

quart per 250 miles is another claim for the car and owing to its extremely light weight, 1700 pounds with touring body, tire mileage of 10,000 to 12,000 per set is claimed.

An aluminum gear carrier on the rear axle forms the housing for the clutch, gear set and rear axle gears. The clutch is an invention of the maker, Mr. Nelson, and is of the multiple disc type, with 31 saw steel to steel hardened and ground plates running in an oil bath. Little pressure on the pedal engages the clutch with a gentle action. The clutch receives its drive from the shaft through a single universal. A selective sliding type of transmission with three speeds forward and reverse is used and the gears are made of solid forgings of specially tough steel and operate on roller bearings.

Six Frame Cross Members.

There are six cross members on the frame, which is very light and of the double dropped pressed steel. The lower edges of the main members are practically at the level of the axles and high kick-ups at each end give the necessary clearance for the springs. This arrangement makes possible a low hung body with ample clearance.

Patent spring suspension is used, semi-elliptic, with scrolls at each end to permit the absorption of vibration and road shocks. In the rear a cross scroll type, supported at the centre and mounted on a tubular cross member, is employed. This form of springing serves as a centering device and supplants the shackles.

Novelties in Steering Equipment.

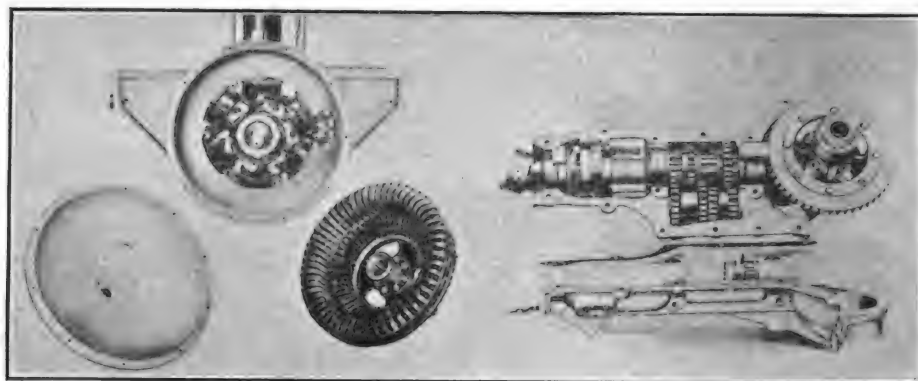
In the steering arrangement there are also a number of unusual features. A divided drop arm on the steering post equalizes bearing stresses and there is also a forked wheel spindle, which distributes bearing stresses and takes care of the castor effect. Through mounting the springs ahead of the centre on the front axle additional castor effect is obtained.

The rear axle is of the full floating type, with spiral bevel gear, and ball bearings throughout. The front axle is a drop forging "I" section.

The wheelbase is 104 inches. With standard equipment, including motor, Stewart speedometer, Waltham clock, ammeter, gasoline and oil gauges, dash light, double windshield and 32x4 S. S. cord tires, with demountable rims, the touring car sells for \$1700 f. o. b. Detroit. \$2200 sedan touring body.

DEFER SAXON DIVIDEND.

The directors of the Saxon Motor Company have deferred action on the quarterly dividend until July 24. The company declared an initial dividend of 1½ per cent. quarterly in July, 1916. The next quarter it was increased to seven per cent. and the stock sold up to 84½, the high record price. It has since declined steadily and following the news of the directors' action last week it sold for 24½.



Starting Device Which Operates Directly on Crankshaft—Gear Carrier Incorporating in One Housing Clutch, Gear Carrier and Rear Axle, Nelson Car.

MASSACHUSETTS CROSSING LAW

THE Governor of Massachusetts on May 12, 1917, signed an act of the Legislature which ought to prove of great value and benefit. It has for its object the erection and maintenance of warning signs on every possible way where the way crosses the tracks of a railroad. In hope that it might prove an inspiration to legislators of other states where these signs have not been required we publish a copy of this law.

Section I. Within six months after the passage of this act, every county, city or town within the Commonwealth shall, except as hereafter provided, and the Massachusetts Highway Commission shall, unless in any case it deems it unnecessary or impracticable so to do, place and thereafter maintain warning signs on every public way subject to its jurisdiction, where the way crosses the tracks of a railroad at grade. The sign shall consist of a metal disc 24 inches in diameter, the field thereof to be enameled white, with an enameled black border line one inch wide, and with an enameled black perpendicular and horizontal cross line 2½ inches wide; the reverse side of the disc to be colored black. In each of the upper quarter rings shall appear, in black enamel, the letter "R," five inches high, ¾ inches wide, the lines to be of one inch stroke. The said signs shall be placed in conspicuous situations beside the public way, on each side of the crossing, and at a distance of not less than 300 feet from the nearest rail of the crossing.

Section II. Every railroad corporation shall, upon request in writing, and within four months after receiving the same furnish to any county, city or town in commonwealth, or to the Massachusetts Highway Commission, as the case may be, a sufficient number of warning signs of the type prescribed by section one hereof to enable such county, city or town, or the said commission, from time to time to comply with the provisions of

section one hereof. The said signs shall be furnished as aforesaid, without charge, unless they are to be used for replacement purposes, in which case the railroad corporation may require the payment of the net cost thereof.

Section III. Upon approaching any railroad crossing at a grade the person controlling the movement of any self-propelled vehicle shall reduce the speed of the vehicle to a reasonable and proper rate, and shall proceed cautiously over the crossing. Any person who violates any provision of this section shall be punished by a fine of not less than \$10 nor more than \$50.

Section IV. If in the case of any railroad grade crossing it appears that the placing of the signs prescribed by section one hereof is impracticable or unnecessary, the public service commission, on petition, may release the county, city or town, as the case may be, from the provisions of said section.

Section V. If any county, city or town shall neglect, for 60 days after the expiration of the six months prescribed in section one, hereof, to comply with the requirements thereof, unless released therefrom by order of the public service commission, or unless prevented by the failure of any railroad corporation to comply with the requirements of section two hereof, and if any railroad corporation shall neglect, for 60 days after the expiration of the four months prescribed in section two thereof, to comply with the requirements thereof, it shall forfeit \$1 for each day during which such neglect continues, to be recovered in an action of tort brought in the name and for the use of the commonwealth by the attorney general or by the district attorney of the district in which the violation occurred.

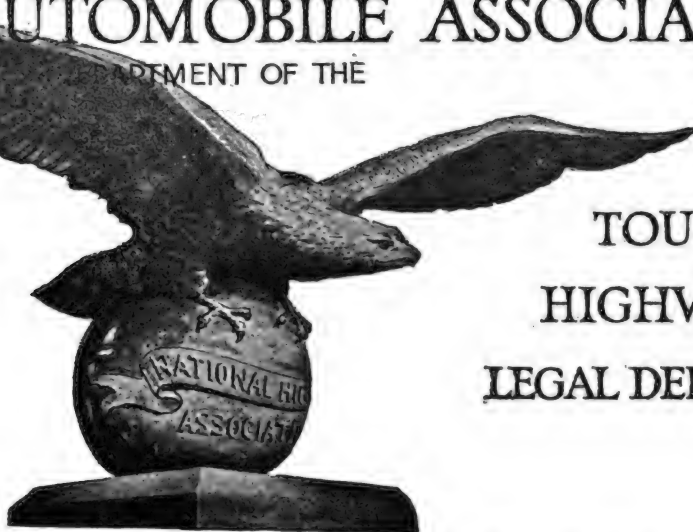
Section VI. Any person who unlawfully removes, throws down, injures or defaces any such sign shall be punished by a fine not exceeding \$10, for the use of the county or municipality placing and maintaining the sign, or of the commonwealth, if the sign is placed and maintained by the Massachusetts Highway Commission.

OFFICIAL JOURNAL OF THE NATIONAL AUTOMOBILE ASSOCIATION

DEPARTMENT OF THE

NATIONAL
HIGHWAYS
ASSOCIATION

TOURING
HIGHWAY
LEGAL DEPTS.



9 PARK STREET, BOSTON, MASSACHUSETTS

OFFICIAL BULLETIN OF POLICE ACTIVITIES

NEW YORK STATE—

A New York State traffic law, the more important features of which appeared in the June 10 issue of the Automobile Journal, has upset or rather nullified most of the traffic rules and regulations of the cities and towns throughout the state. Considerable confusion is likely to result therefrom, but it will be well for motorists to bear in mind the more important provisions of this new law while driving through the municipalities of the entire state.

CONNECTICUT—

The new automobile law of this state has a couple of important features which will be well worth every motorist to have in mind. The first is that if you drive an automobile at a speed of more than 20 miles an hour upon the highways where the houses are less than 100 feet apart it is prima facie evidence that you are driving at a reckless rate of speed, so as to endanger the life and property of others. It is wisely urged that every man driving a vehicle should seek to observe this provision of the law, as it will protect everybody—the people in the automobile, as well as pedestrians and others using the highways.

Another feature is that providing that commercial vehicles be driven at a considerably lower rate of speed than pleasure vehicles in cities, and that any speed in excess of the statutory provision is evidence of reckless driving.

SALEM-SWAMPSCOTT, MASS.—

Motor vehicle police are strictly enforcing the motor vehicle laws on Paradise Road, which is the main state highway connecting Salem and Swampscott.

LOWELL, MASS.—

Owing to many accidents and the continuous reckless and fast driving of motor vehicles in the vicinity of Belle

Grove, motorists are warned to respect the law, and to have a due regard for the rights of others upon the highways near Belle Grove. Those who do not, may expect arrest, as a strict enforcement of the law has been ordered.

WATERTOWN, MASS.—

The selectmen of this town have shown some wisdom in attempting to restrict to some extent the speed at which fire apparatus may travel through the streets of the town. The rules adopted are to the effect that the apparatus must not travel faster than 10 miles an hour through the centre of the town and in other districts a speed of 25 miles an hour is allowed. The rules work both ways, namely, in coming and going to a fire.

While there is a general feeling that fire apparatus and some other public service motor vehicles should have the right of way and should be allowed to proceed at a faster rate than pleasure vehicles, or vehicles engaged in ordinary business, there is nevertheless a feeling that the drivers of these fire and other public service vehicles take too much for granted, their principal aim seeming to be to make as much noise as possible and to usurp all the highway as well as scatter the public without rhyme or reason. This custom, especially among fire apparatus drivers, prevails to a considerable extent in many cities and towns, and the step taken by the selectmen of Watertown is certainly in the direction to check any abuse of a privilege.

SPENCER, MASS.—

The chief of police of this town has started a campaign against fast driving and plans to report the number of all cars violating the law to the highway commission with such a recommendation

as it may deem expedient in each case. If the same driver shall be twice caught violating the law a request will be made to the commission for the revocation of his license.

ITHACA, N. Y.—

The chief of police has published notices that the new state traffic law for the regulation of motor vehicles on streets and highways will be strictly enforced in this city.

SHIRLEY, MASS.—

The police of this town are operating a trap near Woods Village and motorists are warned to keep well inside of a speed limit of 25 miles an hour. Three officers are stationed on this trap.

PHOENIX-RICHMONDVILLE, N. Y.—

The Stamford Village trustees have announced new traffic rules and a traffic officer has been engaged for the summer to arrest all violators of law and especially fast drivers.

WORCESTER, MASS.—

The police of this city have been instructed to hold up all automobiles with glaring headlights and to take the name of the owner and driver. These names will be forwarded to the Massachusetts Highway Commission for such action as they may deem expedient.

SPRINGFIELD, MASS.—

Motorists who leave their automobiles in the streets for a period longer than 10 minutes, in areas where parking is prohibited, are being prosecuted.

NORTHAMPTON, MASS.—

The eight-foot rule with regard to approaching street cars is being rigidly enforced in a number of places, among which are Springfield, Northampton and Worcester.

PROVIDENCE, R. I.—

This city has recently adopted an ordinance designed to regulate traffic in the

congested streets and its enforcement has already been put into operation by the police authorities.

Between 5 and 6 p. m. vehicles are not allowed to stop any longer than is necessary to discharge or take on passengers in the following named streets: Westminster street, between Empire street and Turks Head; Weybosset street,

between Turks Head and Eddy street; Dorrance street, between Washington street and Weybosset street, and Washington street between Eddy street and Dorrance street.

AGAWAM, MASS.—

The selectmen of Agawam have decided to enforce the attorney general's ruling that jitney drivers be bonded and

any jitney driver not having a bond after June 16 and driving through the town will be liable to arrest. This ruling affects all jitneys driving from Springfield through Agawam to Riverside Park. It is planned to have the jitney drivers bonded so as to protect people riding in them and enabling passengers to secure damages in case of accidents.

Good Roads From Important Centers for Tourists

FOR the convenience of tourists we present herewith a brief outline of the more important routes running out of the following named cities to nearby points of interest: New York, Boston, Albany, Providence, Hartford, Montpelier, Concord and Portland.

MOTOR ROUTES OUT OF NEW YORK

COLUMBUS CIRCLE TO POUGHKEEPSIE via Briar Cliff Manor—Run north through Broadway to Yonkers over the Albany Post Road to Scarborough Church; then turn right to Briar Cliff, continuing to Poughkeepsie, along the east side of the Hudson river.

COLUMBUS CIRCLE TO BRIAR CLIFF MANOR—Another road to Briar Cliff Manor is to turn right on Bedford Road in Tarrytown, thence through Pocantico Hills, turning left at Sleepy Hollow Road.

COLUMBUS CIRCLE TO YONKERS Via Riverside Drive—Run north through Broadway, turning left into 72d street, then right into Riverside Drive, running to the end of the drive and coming out into Broadway and Dyckman street. Motorists desirous of crossing the ferry to Fort Lee at 130th street will run as far as Grant's Tomb on Riverside Drive, then down a hill through a narrow street to the ferry. The Dyckman street ferry is reached by running north on Broadway to Dyckman street, which is about 202d street, then turning to the left from Broadway and running west for about two blocks to the ferry.

NEW YORK TO NEW ENGLAND POINTS—Run north through Central Park to 110th street, turning into 7th avenue, thence to 145th street, thence right over Mott avenue bridge and left into the Grand Concourse to Fordham Road at 189th street, then right over railroad at Fordham station, passing Zoological Gardens, then bear right into Pelham parkway and a short distance beyond crossing the White Plains road.

COLUMBUS CIRCLE TO NEW ROCHELLE Via the Old Boston Post Road—This route is a little shorter than the shore road and is on good macadam. Turn left into White Plains Road and a short distance beyond and while under the elevated structure bear right and run through main street into New Rochelle.

COLUMBUS CIRCLE TO WHITE PLAINS—Run north on Broadway to Van Cortlandt Park, then right into and through the park, bearing left at police signal station, first turn right, coming into Central avenue at Woodlawn Cemetery, following to White Plains.

COLUMBUS CIRCLE TO THE WATER SHED DISTRICT—(And the inside route to the Berkshires)—Run through Broadway to Dobbs Ferry. Then right onto and through the Saw Mill River Road; then through Elmsford, Briar Cliff, Hawthorne and Plainfield.

COLUMBUS CIRCLE TO LOWER WEST CHESTER COUNTY AND WHITE PLAINS—North through Central Park to 110th street, then right for one block, turning left into 7th avenue, then right on 145th street, over bridge over Harlem river, left into Mott avenue which becomes the Grand Concourse, and then follow to the end, turning right on Moshulu Parkway and left onto Van Cortlandt avenue, running two blocks, then left on Bainbridge avenue, passing Woodlawn Cemetery; then right onto 233d street across railroad and two blocks beyond turn left onto Carpenter avenue. At the end of the road turn right into South street one block and then left onto White Plains Road, over railroad into Lincoln avenue and Mount Vernon. Motorists desirous of going to Bronxville will turn left into Gramatan avenue into Bonfield Road.

COLUMBUS CIRCLE TO NORTH SHORE OF LONG ISLAND—Run east through 57th street into 2nd avenue, turning left two blocks, then right over Queensboro bridge. Immediately turn left through Plaza into Prospect street, and at the end of the street right into Webster avenue, thence left into Jackson avenue and continuing to Flushing. For more distant north shore points continue straight ahead.

COLUMBUS CIRCLE TO CONEY ISLAND Via Williamsburg Bridge—Run through 60th street to 5th avenue, turning right and running into 4th street square, thence left on Lafayette street, then right to Kenmare street. Turn left here, crossing the Bowery into Delancy street, across Williamsburg bridge, running straight through Plaza, then right through Roebling street, through Taylor street. Bear left into Bedford avenue and passing Gen. Slocum's statue. Then right through Parkside avenue, through Ocean avenue, following the same to Manhattan bridge, passing Sheepshead

Bay Speedway. The Ocean Parkway can be taken by continuing through Parkside avenue, then turning left onto Parkway to Brighton Beach, Hamilton Parkway and Cropsey avenue may be used from Prospect Park to Coney Island.

NEW YORK TO CONEY ISLAND Via Brooklyn Bridge—Through Lafayette street to the City Hall. Then left across Brooklyn Bridge and turning right into Liberty street, then bear right into Clinton street and left into Atlantic avenue, through Cropsey avenue to Coney Island.

NEW YORK TO CONEY ISLAND (Perhaps the best route)—Follow 4th avenue to Degraw street to the Plaza, thence through Prospect Park and along the Ocean Parkway to Coney Island.

NEW YORK TO STATEN ISLAND—The most direct route is through Broadway to the Battery. Another route is through 60th street to 5th avenue. Left onto 4th street and right onto Lafayette street, passing City Hall and turning to the right into Chambers street and left into Broadway to Battery. Take municipal ferry to St. George, Staten Island.

NEW YORK TO NEWARK and Points Beyond in Southern New Jersey, Philadelphia, Easton and Delaware Water Gap—From Columbus Circle through 8th avenue to 43rd street, thence right to 42d street ferry in New Jersey and leaving the ferry run to the top of the hill, then left, then right, through 3rd street to Hudson County Boulevard and about six miles from the ferry turning left and running to small park; through the park and around monument at Plank Road, thence to Newark. For Orange, after reaching Newark, right into Broad street, then left through Central avenue, following it to East Orange.

NEW YORK TO MONTCLAIR, Pompton and Ramapo Country—About four miles down the Hudson County Boulevard turn right at trolley crossing into Newark avenue, over railroad grade crossing, bearing right at once into Arlington Turnpike through Bellville, through Johns street, into Montclair.

COLUMBUS CIRCLE TO RIDGEFIELD to Leonia—Take 42nd street ferry and at top of hill in Weehawken bear right, running through Boulevard through winding road along the Palisades to small hotel, bearing right, then left, passing Fair View Cemetery into Rochelle, continuing straight ahead through Leonia into Englewood.

COLUMBUS CIRCLE TO TOTTENVILLE and Southern New Jersey Points—From the ferry house at St. George passing Richmonds Borough, bearing



Off on a June Morning.

left through Tompkins square and following Bay street past the Marion Hospital into Vanderbilt avenue, through Richmond road and bearing left into Tottenville.

COLUMBUS CIRCLE TO RAHWAY Elizabethtown and Plainfield—From the ferry pass Richmonds Borough, right through Tompkins Square into Richmond Turnpike, following same to Carteret ferry and continuing straight ahead to Woodbridge on the Rahway-Perth-Amboy Turnpike.

COLUMBUS CIRCLE TO HACKENSACK AND TUXEDO, and West Side of Hudson River—Run north through Broadway or Riverside Drive, crossing 130th street ferry, up Fort Lee Hill and at the top of the hill bear left, following main road straight ahead through Leonia to Hackensack. Take Essex street direct for Paterson and for Suffern, Arcola and Tuxedo, running through Passaic avenue. For Englewood and Bear Mountain cross Dyckman street ferry, continuing straight ahead down hill to Englewood. For Bear Mountain, at the top of the hill after leaving ferry, bear to the right and run through Sparkhill to Nyack.



Down a Park Path.

ALBANY, HARTFORD, PROVIDENCE

ALBANY, N. Y., TO LAKE GEORGE REGION Via Saratoga Springs—Start west on State street. At Capitol right and next left on Washington avenue. Right at four corners onto Northern Boulevard, at the end of which turn left and then right to Loudenville. Go through Newtonville, Lathams Corners, Cohoes, Waterford, Mechanicsville, Maltaville, Saratoga Springs, Wilton, South Glens Falls, Glens Falls, French Mountain to Lake George.

ALBANY TO KINGSTON—Follow the west side of the Hudson through Cedar Hill, Ravena, Coxsackie, Athens, Catskill, Cementon, West Camp, Evesport, Malden, Saugerties to Kingston.

ALBANY TO PITTSFIELD—Southeast on Broadway, over Hudson Bridge to Rensselaer, East Greenbush, Nassau, West Lebanon, New Lebanon Center, New Lebanon, Shaker Village, Mass., to Pittsfield.

ALBANY TO BENNINGTON, VT.—At Capitol turn right and next left with trolley on Washington. Right onto North Boulevard and at end turn left. Take right hand road and at four corners turn left to Loudenville, Newtonville, Lathams Corners, Troy, Center Brunswick, Raymertown, Pittstown, Boyntonville, Potters Hill, Hoosick, Old Bennington, Bennington.

ALBANY TO GREAT BARRINGTON Via Hudson—Go over Hudson River Bridge to Rensselaer, East Greenbush, Schodack Center, Valatie, Chatham, Austerlitz to Great Barrington.

HARTFORD, CONN. TO SPRINGFIELD—East on Central Row. Turn left and next right on State street. Curve left with trolley on Connecticut Boulevard to East Hartford, left with trolley on Main street. Keep left with trolley under railroad and bear left with trolley to South Windsor, East Windsor, Warehouse Point, Enfield, Thompsonville, Longmeadow, Mass., to Springfield.

HARTFORD TO NEW HAVEN Via

Turnpike—Run south on Main street with trolley. Right at park, into Maple avenue to Berlin, Meriden, Tracy, Wallingford, North Haven to New Haven.

HARTFORD TO DANBURY Via Waterbury—West on Asylum street and left on Farmington street to West Hartford, Farmington, Plainville, Forestville, Bristol, Terryville, Plymouth, Thomas-ton, Waterbury, Middlebury, Woodbury, Southbury, Sandy Hook, Newtown to Danbury.

HARTFORD TO THE BERKSHIRES Via Winsted—North on Main street into Albany avenue. Left at fork, away from trolley and right with travel to Avon. Go through Canton, New Hartford, Winsted, Norfolk, East Canaan, Canaan, Ashley Falls, Sheffield, Great Barrington, Stockbridge, Lenox to Pittsfield.

HARTFORD TO PROVIDENCE Via Willimantic—Run east on Central Row with trolley. Curve left on Connecticut Boulevard, at the end of which turn right with trolley over bridge to East Hartford, Manchester, Manchester Green, Bolton Notch, Andover, Willimantic, North Windham, Chaplin, Phoenixville, Abington, Pomfret Center, Pomfret, Putnam, Chepachet, Harmony, Greenville, Centerdale to Providence.

HARTFORD TO PROVIDENCE Via Stafford—East on Central Row. Right into State street and curve left with trolley on Connecticut Boulevard, at the end of which turn right over bridge to East Hartford, Manchester, Manchester Green, Bolton Notch, Andover, Willimantic, North Windham, Hampton, Brooklyn, Danielson, Hopkins Mills, North Scituate, Olneyville to Providence.

PROVIDENCE TO BOSTON—Run southeast on Dorrance street and left onto Exchange Place. Waterman street and left on Thayer street. Left on Hope street. Straight ahead on East avenue to Pawtucket. Right on Main street. Left with one line trolley on Broadway. Right on Highland avenue and left with

trolley on County street to Attleboro. Run through Norton, Mansfield, Foxboro, Sharon, Canton, Ponapoag, Mattapan, Forest Hills to Boston.

PROVIDENCE TO TAUNTON—Run southeast on Dorrance street, left at farther end of park and again left over Exchange Place trolley, coming into Waterman street into East Providence, Rehoboth, Westville to Taunton.

PROVIDENCE TO FALL RIVER—Southeast on Dorrance street, left at farther end of park and again over Exchange Place trolley, left over Benefit street, into Waterman street to East Providence. Left into Waterman avenue to Seekonk and right with trolley. Luther's Corners, Swansea, Fall River.

PROVIDENCE TO NARRAGANSETT PIER—South on Dorrance street and right on Weybosset street. Left on Broad street. Go by Roger Williams Park and at the end road turn right. At end of road turn right and immediately left with trolley. Right by Town Hall to Apponaug, East Greenwich, Wickford, Hamilton, Saunderson to Narragansett Pier.

PROVIDENCE TO NEW LONDON Via Westerly—Follow previous route to Narragansett Pier, thence right on Kingston Road over railroad and turn right at end of the road. Go through Charlestown, Westerly, Stonington, Mystic, Noank, Groton and take ferry to New London.

PROVIDENCE TO WILLIMANTIC—Run northwest on Dorrance street and left at Fountain. Right into Broadway to Olneyville, North Scituate, Hopkins Mills, Danielson, Conn., Brooklyn, Hampton, Clark's Corner, North Windham to Willimantic.

PROVIDENCE TO WILLIMANTIC Via Putnam—Northwest on Francis street under Union Station and at the end of the street turn left on Smith street. Keep left at fork to Centerdale, Greenville, Harmony, Chepachet, Putnam, Abington, Chaplin to Willimantic.

MOTOR ROUTES OUT OF BOSTON

AUTOMOBILISTS will find the following more important routes running out of the City of Boston to nearby points of interest:

BOSTON TO GLOUCESTER AND CAPE ANN Via Salem (39 Miles)—Run north over Harvard Bridge to Cambridgeport. Turn right on Prospect street and left on Webster street into Somerville. Straight ahead on Webster street and right upgrade on Walnut street, to Middlesex Fells, Parkway, to Medford and right onto Revere Beach Parkway, through Revere, Lynn, Swampscott, Salem, Beverly, Pride's Crossing, Beverly Farms, Manchester-by-the-Sea, Magnolia to Gloucester and ahead to Cape Ann.

BOSTON TO NEWBURYPORT Via Turnpike (36 Miles)—Run north over Harvard Bridge to Cambridgeport. Turn right on Columbia street, left on Broadway and right on Prospect street. Left on Webster avenue into Somerville. Turn right upgrade on Walnut street into Middlesex Fells Parkway into Medford. Right onto Revere Beach Parkway to Everett. Left on Broadway to Lynnfield and follow poles to Newburyport.

BOSTON TO READING Via Stoneham (14.5 Miles)—Run north over Harvard Bridge through Prospect street, Webster avenue to Somerville, then right upgrade on Walnut street to Medford. Curve right at Spot Pond to Stoneham to Farm Hill to Reading.

BOSTON TO LOWELL (27 Miles)—Run north over Harvard Bridge to Cambridgeport. Right on Prospect street. Left on Webster avenue to Somerville to Fellsway. Left on Mystic avenue to Medford. Sharp left at City Hall on High street and right at five corners to Winchester, Woburn. Right on Cambridge street, curving left at three corners to Wilmington, Tewksbury. At farther end of park turn right with trolley around school on High street. Ardmore street. Left and right into Appleton street and right into Gorham street, Lowell.

BOSTON TO FITCHBURG Via Concord and Ayer (48 Miles)—Run north over Harvard Bridge to Cambridge. Curve right with Massachusetts avenue around Harvard, keeping left at fork, to Arlington, Lexington. Left at monument. Left at fork into Lincoln avenue. Right at fork on direct road to Concord. Then go through North Acton, Littleton, Common, Lunenburg to Fitchburg.

BOSTON TO WORCESTER Via Auburndale (41 Miles)—Take Commonwealth avenue to Auburndale by Norumbega Park and take second road to the right to Weston. Left at end of road and right at next fork to Wayland, South Sudbury. Right at fork, left at fountain and right into Main street, Marlboro. Left at monument to Northboro, Shrewsbury. Left at fork and at next fork into Worcester.

BOSTON TO WORCESTER Via Wellesley and Framingham (45.8 Miles)—Take Commonwealth avenue to Allston, through Brighton to Auburndale. Left on Washington street beyond car

barns to Newton Lower Falls, Wellesley Hills, Wellesley, by College buildings to Natick, Framingham. Right on Concord street and left on Union avenue. Left at Soldiers' Monument to Framingham Center, Southboro, Westboro, Shrewsbury, Worcester.

BOSTON TO WOONSOCKET—Run out through Jamaicaaway and left on Arborway through four corners and at next four corners turn sharp right and next left upgrade on Center street to W. Roxbury. Spring street and keep left at Bridge street and left on Ames street to Dedham, through Norwood, Walpole, Wrentham, Wampum, Sheldonville to Woonsocket.

BOSTON TO PROVIDENCE—Run out through Forest Hills to Mattapan, Ponkapog, Canton, East Sharon, Sharon, Fox-

boro, Wrentham, Wampum, Plainville, North Attleboro, Pawtucket to Providence.

BOSTON TO CAPE Via Plymouth—Boston to Mattapan, East Milton, Quincy, bear left on Washington street, to Hingham, following Jerusalem Road to Cohasset, North Scituate, Egypt, Scituate Centre, Greenbush, Marshfield Hills, Marshfield, Kingston to Plymouth. Straight ahead through Manomet, Cedarville to Sagamore, over canal to Sandwich, Spring Hill, West Barnstable, following macadam road straight ahead for all points on northern side of cape to Provincetown.

BOSTON TO NEWPORT Via Fall River—Boston, Mattapan, Ponkapog, Canton, East Sharon, Sharon, Foxboro, Mansfield, Taunton, Dighton, Somerset, Fall River, Globe Village, Tiverton, Newport.

CONCORD, MONTPELIER, PORTLAND

TO THE various scenic centres of New Hampshire and adjoining states the following are the main routes:

CONCORD, N. H., TO WHITE MOUNTAINS Via Franklin—Follow the Merrimac Valley Boulevard, which is marked by green bands on the telegraph posts from Concord, through West Concord, Boscawen, Gerrish, Franklin, Tilton, Winnisquam, Laconia, Lakeport, The Weirs, Meredith, Holderness, Ashland, Plymouth, West Campton, West Thornton, Woodstock, North Woodstock, Flume House, Profile House, Twin Mountain House to Bretton Woods.

CONCORD TO PORTSMOUTH Via Dover—Run north on Main street and right into Bridge street. Left at fork then right fork and again right fork to Gossville. Go through Epsom, Northwood Center, Northwood Ridge, East Northwood, Barrington, Dover. Sharp right on Central avenue. Left at fork. Go over long bridge and at three corners curve left. Left at fork into Maplewood avenue. Right at fork to Portsmouth.

CONCORD TO BOSTON Via Manchester—Run south with trolley on Main street and left at fork into Water street. Go through Pembroke, Suncook, Manchester, West Manchester, Reed's Ferry, Nashua, Tyngsboro, North Chelmsford, Lowell, Tewksbury, Wilmington, Woburn, Winchester, Medford, Somerville, Cambridgeport to Boston.

CONCORD TO LAKE WINNIPESAUKEE—Run north on Main street. Then right into Bridge street. Go through Chichester, North Chichester, Pittsfield, Barnstead, Center Barnstead, Alton, Alton Bay, bearing right to Lakeport to the Weirs.

PORTLAND, ME., TO BANGOR Via Brunswick—Northeast with trolley on Congress street to Monument square. Left on Washington street at sign "Brunswick" to Falmouth Foreside, Underwood Springs, Yarmouth, Freeport, Brunswick, Bath. Take ferry over Ken-

nebec river to Woolwich, Wiscasset, North Edgecomb, Newcastle, Damariscotta, Nobleboro, Waldoboro, West Warren, Thomaston, Rockland, Rockport, Camden, Lincolnville, Northport, Belfast, Searsport, Stockton Springs, Prospect. Go straight through four corners at bear right at fork to Frankfort, Winterport, Hampden, East Hampden to Bangor.

PORTLAND TO AUGUSTA Via Brunswick—Follow previous route to Brunswick, thence go north on Main street over bridge. Right at water trough to Topsham, Bowdoinham, Richmond, South Gardiner, Gardiner, Hallowell to Augusta.

PORTLAND TO POLAND SPRINGS—Run southwest on Congress street following trolley. Right on Forest avenue. Left at fork. Fork beyond railroad crossing curve right with trolley on Allen avenue, over railroad to Allen's Corners. Left, sign "Gray." Keep right at fork. West Falmouth. Right at monument into Gray. Left to Dry Mills and keep right to Sabbath Day Lake and keep right to Poland Spring.

PORTLAND TO SEBAGO LAKE TO NAPLES—North on State street, sign "White Mountains." Highland Lake, North Windham to Raymond, Sebago Lake to Naples.

PORTLAND TO PORTSMOUTH—South on Pine street. Left on Vaughan street. Right on Denforth street to Scarborough, Saco, York Square, Biddeford, Kennebunk, Wells, Ogunquit, Cape Neddick, York Beach, York Harbor, York Village, York Corners, Kittery to Portsmouth.

MONTPELIER, VT., TO ST. JOHNSBURY—Montpelier, East Montpelier, Plainfield, Marshfield, West Danville, Danville to St. Johnsbury.

MONTPELIER TO BURLINGTON—Montpelier, Middlesex, Waterbury, Jonesville, Richmond, Williston to Burlington.

MONTPELIER TO WELLS RIVER—Montpelier to Barre, East Barre, Orange, Groton, South Ryegate to Wells river.

STAGE DAYS AGAIN ON CALIFORNIA TRAILS

Modern Motor Coaches Established on the Old Routes Made Famous by Vanished, Famous Horse-Drawn Vehicles

MANY of the old California trails, which not so many years ago were the route of the old stage coaches, have been converted into boulevards and are now traveled by luxurious automobile stages that make more mileage in a day than was traveled in a week by the old horse stage coaches.

The automobile transportation possibilities in California are so large and so certain that even as extensive as the business has become almost overnight, the development has only begun.

The traveling public has taken to the motor car as a means of quick transit with the same eagerness that the hundreds of thousands of Americans showed in adopting the automobile to the exclusion of the horse.

The popularity of the motor stage is especially marked in California, which with its wonderful climate the entire year and extensive boulevards is the ideal country for motor travel.

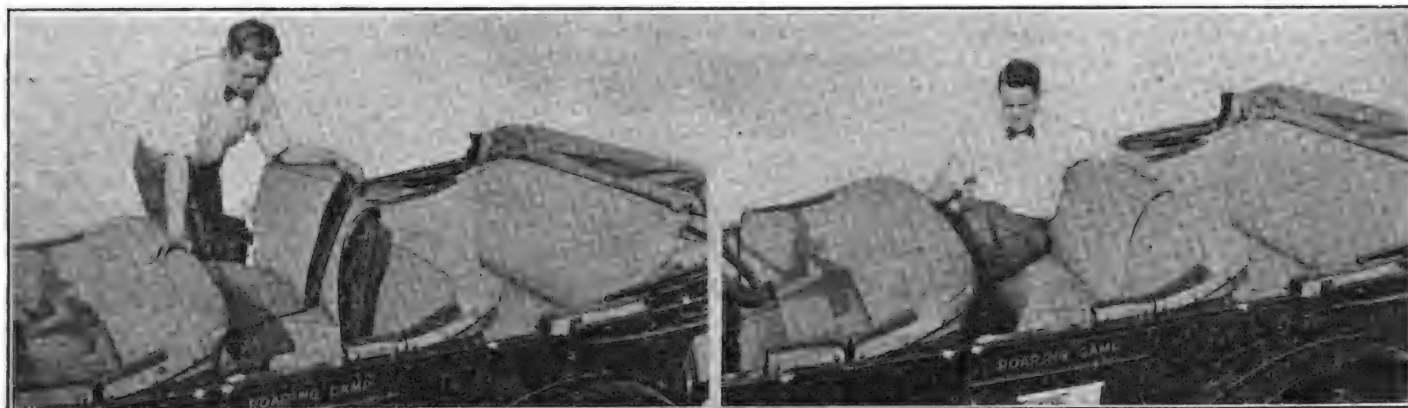
important in the state that they have been placed under railroad commission supervision. The same laws that apply to the regulation of schedules and tariffs of the railroads also apply to the stage lines. The competition of the stage lines is keenly felt by the railroads, who have taken off many local trains in the territory where the larger motor stage lines are operating.

One of the latest companies to go into the motor stage business has many new and unique features, both in regard to the construction of the cars and the service. This line operates 14 cars from Los Angeles to Bakersfield and Taft, but the service is becoming so popular that the fleet is increasing rapidly and is expected that there will be at least 25 cars in operation within the next few months.

These cars operate on a schedule never varying 10 minutes, the drivers are under bond, are all dressed in uniform, and their service motto is safety, comfort

These cars have been equipped to burn distillate. In the last two months eight of the cars have consumed nearly 10,000 gallons of distillate in a total of over 90,000 miles. A little over nine miles were made on each gallon of distillate. The use of distillate in such high grade cars is an innovation that was introduced in Los Angeles a few months ago by the Earle C. Anthony Co., Inc., and according to reports from operators who have been using this fuel the usual running cost has been cut almost in half as compared with the use of gasoline.

Instead of giving the motor stages numbers, each car has been given an individual name. The names were selected from among the characters of stories that Bret Harte and Mark Twain wrote about this part of the country during the great gold rush of '49. "Bret Harte" and "Mark Twain" lead the fleet, while other names, such as "Roaring Camp," "Yuba Bill," "Mountain Jimmy," etc., are paint-



Packard Autocar of Modern California Stage Line, Showing Removable Seat Arrangement—They Operate in Interurban Service on a Fixed Schedule and the Operators Are All Uniformed.

That, coupled with the fact that expensive equipment has been adapted to insure comfort along with speed and safety, explains why Los Angeles is the centre for the operation of some of the world's largest motor stage companies. The motor stage business began in a very modest way, but now has developed into one of the most important phases of transportation in the state, even rivaling the railroad and electric lines in many lines.

Los Angeles is dotted all over with the terminals of stage lines, with large numbers of travelers waiting to take the stages at practically all hours of the day.

The motor stage is not to be confused with the jitney 'buy'. The automobiles used in interurban service are as a rule of the best class, with daily receipts amounting to 10 times that of the jitneys.

The motor stage lines have become so

and courtesy to every passenger. The company is capitalized at \$175,000.

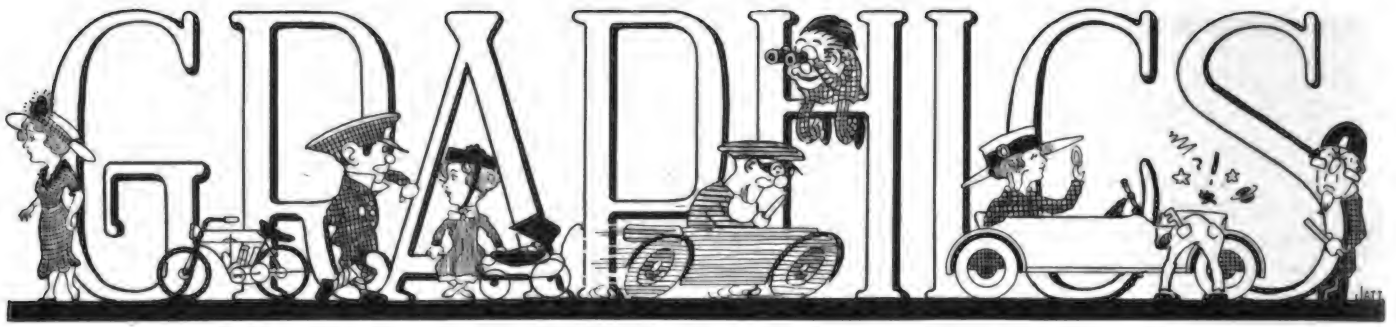
Each car carries eight passengers as a maximum load. Phone reservations can be made and the cars will stop to pick up passengers in the down town section, or at their homes, if the passengers live close to the regular stage route. Stations are provided along the route, with semaphores at various points for flagging the cars. All the cars operated by this company are Packards, which have been remodeled by the Los Angeles Packard shops. Baggage racks have been built on the running boards for carrying suitcases and any other baggage, with canvas cases to protect the contents from dust. The seat arrangement is unique. The auxiliary seats have been replaced with the seating arrangement shown in the enclosed pictures. A third section of seat has been installed which can be removed to allow persons in the rear seats to pass through.

ed in large, bold letters on the rear doors, as shown in the illustration.

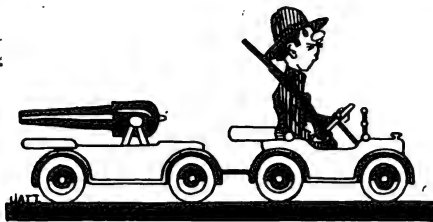
HARTFORD HUSTLER OUT.

The Hartford Hustler, Vol. I, No. I, with the slogan "Knowledge Is Power," is out, containing full descriptions and illustrations of the Hartford Shock Absorber, Hartford Bump Absorber and Hartford Auto Jack. The reading matter is thoroughly educational to those seeking comfortable riding and the illustrations graphically show everything connected with Hartford equipment.

The Guide to Riding Comfort, of six pages, is of paramount assistance to those wishing to know how to select a suitable shock absorber for a car. Practical sales pointers on all Hartford equipment are also included between its covers. The book is published by Edward V. Hartford, Inc., Jersey City, N. J., and is for gratuitous distribution.



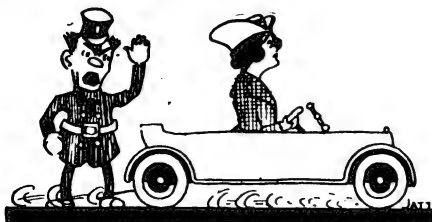
Registration of private motor cars for the use of the home guards in various points has brought out the fact in Wakefield, Mass., that in the event of an attack on that town the members of the said home guard would have to duplicate the feats of the Roman equestrians



in order to save the surplus machines from the foe, by driving off two at a time. At last accounts there were 100 cars registered for the use of the home guards and only about 50 citizens attending the drills of that efficient military organization.

Less than one year ago the American aircraft industry, an outgrowth of automobile manufacture, did not exist. The ordinary motorist, too, has hardly become accustomed to the suddenness of the flying machine. The animal drawn cart, the chariot, the coach, the steam and the electric railway record the progress of the centuries in man's solution of transportation. With the advent of the automobile, a few years ago, it was thought the last word in the refinement of individual transportation was reached. But suddenly all this has been changed. Millions of dollars have been voted for aircraft by Congress, and the industry thus suddenly born has become a vital necessity in the plan for any present or future defense of this nation.

A young woman in New York, who has an irresistible desire to exceed the speed limit, following her third arrest for the offense, offered to go to France and serve as a driver in the American Ambulance Corps in way of expiation for her acts. She had been fined \$100 and sentenced to 10 days in jail and was about to accept the penalty when a friend

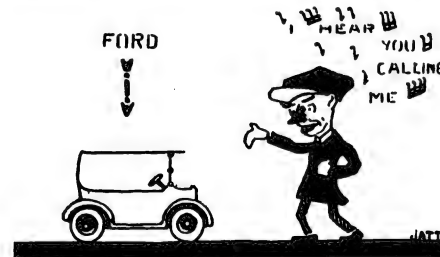


dropped into court and paid the fine. In grateful repentance she offered patriotic service.

George Twombly, the Boston National League outfielder, has quit the great national game on the diamond for good and entered the automobile accessory business, with New England for a territory. George is no aviator, still he ought to spear business, so to speak, on the fly.

The arrival of more Russian shell orders in New England motor industries, which have been engaged for some time in making munitions, means some additional work for the carpenters and builders.

A Kansas physician who started his motoring career with a Ford car many years ago, has since that time purchased 17 other cars of various makes, the last one being the latest model of his first machine. Back to his first love again,



he says it is a delusion that a heavy car elevates a man professionally or socially.

Modeled on the plan of a cigar that swells in the middle and tapers at each end—that is the blimp. What is a blimp? It is the new balloon ship that will motor through the air, on coastal defense work, at a great height—nearly two miles—and will have a potential speed of 45 miles an hour.

The Highway Commissioner of Ohio has advertised for bids for the construction of 52.25 miles of new state roads in that state to cost approximately \$836,207.73, and bids for the repair of 97.57 miles of roads to cost \$124,381.

The Buffalo, Rochester and Pittsburg railroad has arranged for a fleet of tractors to be used in increasing the land under cultivation along its lines.

The Auto Club of Southern California has offered to provide adequate metal sign posts bearing the official Lincoln

Highway Association insignia for that part of the route from Salt Lake City, Utah to Ely, Nev.

Massachusetts automobilists when they get their 1918 registration plates hung on their cars will appear like speedway champions going on a track, as the new plates are much larger than the old ones,

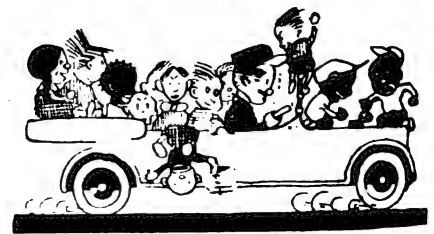


and are white with a blue number, which exaggerates the dimensions. The plates with six numbers on them will be 6½ inches deep and 14 inches long, or 10 square inches larger than those at present in use.

Many motorists using the Metropolitan parkway were forced to make a wide detour through Everett, Mass., because Mayor Mullen of that city demands the park board maintain a traffic officer where the boulevard crosses the city's main street. To force his demand the Mayor erected several wooden sawhorses across the boulevard and was only persuaded by the United States government to remove them even temporarily to allow of the transportation of munitions to Marblehead.

Austin C. Dunham, an inventor of Connecticut, has presented to the U. S. War Department the rights to a patent recently taken out by him covering a special automobile wheel which mounts an ordinary rubber tire for road work and at the same time can be converted into a flange wheel for use on railroad tracks within a few minutes.

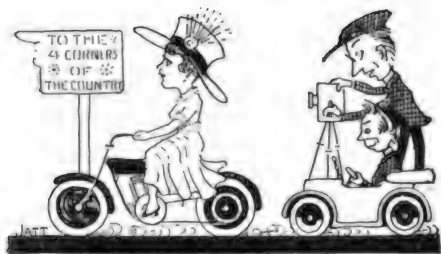
The annual automobile outing given for the benefit of the children of Boston by the Boston Automobile Dealers' Association, was held Wednesday, June 6. Dozens of machines provided by the deal-



ers carried loads of youngsters to Nantasket Beach, where they enjoyed games, sports and a dinner.

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Movie patrons seldom have the opportunity of seeing their favorite stars in the flesh, and for that reason the Ince-Triangle studios are sending Miss Ruth McCord out on a 25,000-mile motorcycle trip, during which she will visit over 150 cities and appear in person at over 200 Triangle motion picture theatres. She will also visit the extreme four corners



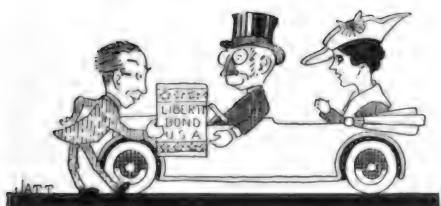
of the country and drive a Triangle stake at each one.

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One of the notable June tours was the overland trip of the San Francisco Advertising Club to St. Louis to attend the national convention of ad men. There were 14 automobiles in the caravan. On leaving San Francisco on their two weeks' ride Mayor Rolph handed the delegates a letter to Mayor Kiel of St. Louis. The underlying purpose of the cross country caravan was primarily to advertise San Francisco as the place for the 1918 convention. The delegates were well armed to put it over successfully—and they did. At Salt Lake City several of the cars were in such a plight from bad weather and road conditions that they were shipped on to Denver by freight. The Studebaker pilot car was one that fought the whole route through, coming into St. Louis only three hours behind schedule.

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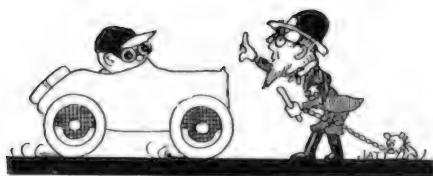
The automobile trade and industry has teemed with manifestations of patriot-



ism since the war started. One concern that displayed a practical form of devotion to their flag and country is the R. D. Britton Co., agents for Vellie and Allen cars at Hartford, Conn. This company had an offer out for a time to give a \$50 Liberty Bond to every person purchasing either a Vellie or Allen car for cash.

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Autoists should have a care in passing through the town of Spencer, Mass., as Chief of Police John M. Norton has placed himself on record as being a particularly vigilant minion of the law. He intimates that he will show little leniency toward speeders who pass through, reporting each and every one to the highway commission, with recommendation



for punishment. In case of a second offense he will request that the highway commission deprive the offender of his license.

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The hotels in Boston know that the touring season is on. Hundreds of cars are already passing through the Hub to the cool mountain and shore resorts to the north. The automobile is the only reliable train this year.

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The United States was never so automobilized as at present. On the general moving day about the first of September it is expected the country will be found pretty generally automotivated. At any rate the motor wagon is, as usual, a prominent factor in war as in peace.

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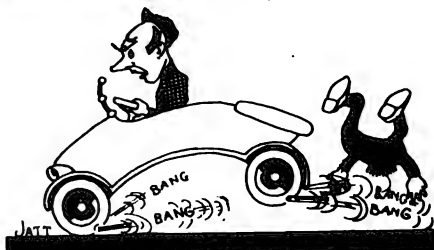
Olin H. Chase, the new commissioner of motor vehicles in the State of New Hampshire, was formerly the proprietor of the Newport Champion. While watching over the actions of the motorists in the state he will also keep his



weather eye out for the politicians through the editorial columns of the paper that he formerly conducted. Our artist helps us see the motor official bent on turning out a properly seasoned column.

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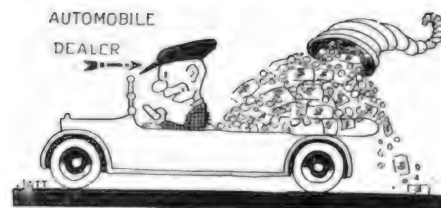
A man named Prevost of Burlington, Vt., while not holding a military commission such as his name would suggest, recently thought he had been precipitated into a trench bombardment and was actually on the firing line with real injuries to prove it. While walking on a railroad crossing an automobile came close by and one of the tires burst. As he jumped with surprise to one side another tire burst on the machine, causing the latter to lurch and knock him to the ground. A passing physician dressed the wounded man's injuries and after taking him to his home explained that, contrary to his suspicions, no Germans had as yet invaded the country.



International races this year have some notable entrants. Kaiser Wilhelm entered his high-powered machine "Autocracy" with such insistence and determination that Uncle Sam stepped in for a try at the sweepstakes also. He calls his car "Democracy," because, he says, he "let's everybody drive."

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The State of Connecticut will take in about \$1,000,000 through its automobile department for the year ending Oct. 1, basing the estimate upon the receipts to June, which are \$917,659.42. Dealers have been selling so many machines in



the old Nutmeg state, apparently, that there is an increase of \$266,894.05, as compared with the corresponding period of 1917, when the receipts were \$650,765.37.

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Seventy-one of the 75 men on the day shift of the Automatic Products plant, Detroit, "not one of whose names could we pronounce," said a salesman, subscribed to Liberty Bonds.

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Formal announcement of the government's policy as to all types of aircraft except Zeppelins was made recently by Howard E. Coffin, head of the aircraft board recently created by the Council for National Defense. The object aimed at the first year, according to Mr. Coffin, is the production of a minimum of 3500 training and battle airplanes; the education of from 5000 to 6000 aviators and the doubling, or more, of the production capacity during the second year.

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In Springfield, Mass., the authorities are making rapid progress in handling



the traffic cases and instilling in the minds of the motorists that violations of the traffic code will meet with severe and hasty punishment. Judge Heady of that city has been imposing fines of \$20 for each violation and his action has had the effect of greatly increasing the caution among operators.

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In general, the automobile industry displayed itself nobly in taking up Liberty Bonds. They see, too, an excellent instance of reciprocity. Uncle Sam buys the automobiles and motor trucks; they in turn buy his Liberty Bonds and thus help him pay for the vehicles of war, realizing that in paying for them he is paying their wages.

PLATE FOUR

BRICK GARAGE FOR THE HOUSING OF ONE CAR

Snappy Substantial, Structure Designed for Wall Units of Rough Texture, Flemish Bond Pattern and With Asbestos Shingle Roof

Design by the Architectural Department of the Automobile Journal Publishing Co.

Plate IV of the series of garage designs made by the Architectural Department gives the plans and valuable detail for building a private garage of brick and fire-resisting construction. This plan presents another ideal shelter for the automobile, more than comparable with those already published in this special series, and more of which in private garages, commercial garages and service stations follow. Builders' estimates and details are readily procurable on application.

APPPEARANCE and construction are important points in garage building. To be substantial, neat and able to withstand the ravages of time, a garage must be built of lasting materials, and so brick has been selected for the construction of the garage shown in the accompanying drawing, a private garage for housing a single car. In general appearance this garage is snappy, carrying a mark of distinction that would beautify any estate. It is especially suitable for the owner who takes pride in the care and upkeep of his car, and wishes the facilities at hand to insure that this shall be done.

This garage of the one-car type is spacious and well lighted. It has many novel features, completeness of detail and special advantages in spacings and equipment. The size is nearly 18x22 feet, giving ample room for the housing of a car of the largest touring type.

The sub-structure, or foundation, is concrete, in the construction of which, to get the best results, pains should be taken to see that the concrete is properly mixed and poured in forms of suitable size. No less care should be exercised with the foundations of a garage, it may be said, than would be observed in a larger or costlier building. As to the depths of foundations opinions vary. Those shown, however, are three feet six inches deep, ample to take care of a building of this size. If these foundations are made with a good mixture in the proportions of one quart of a good Portland cement, three parts sand and five parts coarse aggregate, the sub-base will amply carry the weight of the superstructure and be sufficiently dense to withstand any action of frost.

The superstructure, which is of brick construction, has solid walls, and a wood-timbered roof covered with asbestos shingles. The trimmings are of wood, and, by way of external ornament, the design includes a wrought iron lamp bracket over the portal. To get the desired effect of the designer a brick with a rough texture should be used, and it should be laid in the Flem-

ish bond pattern, having a joint not less than five-eighths of an inch thick to be struck flush with the brick.

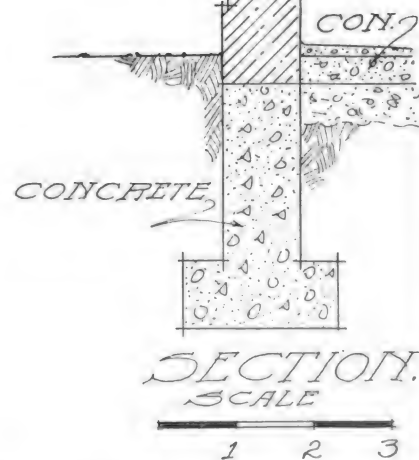
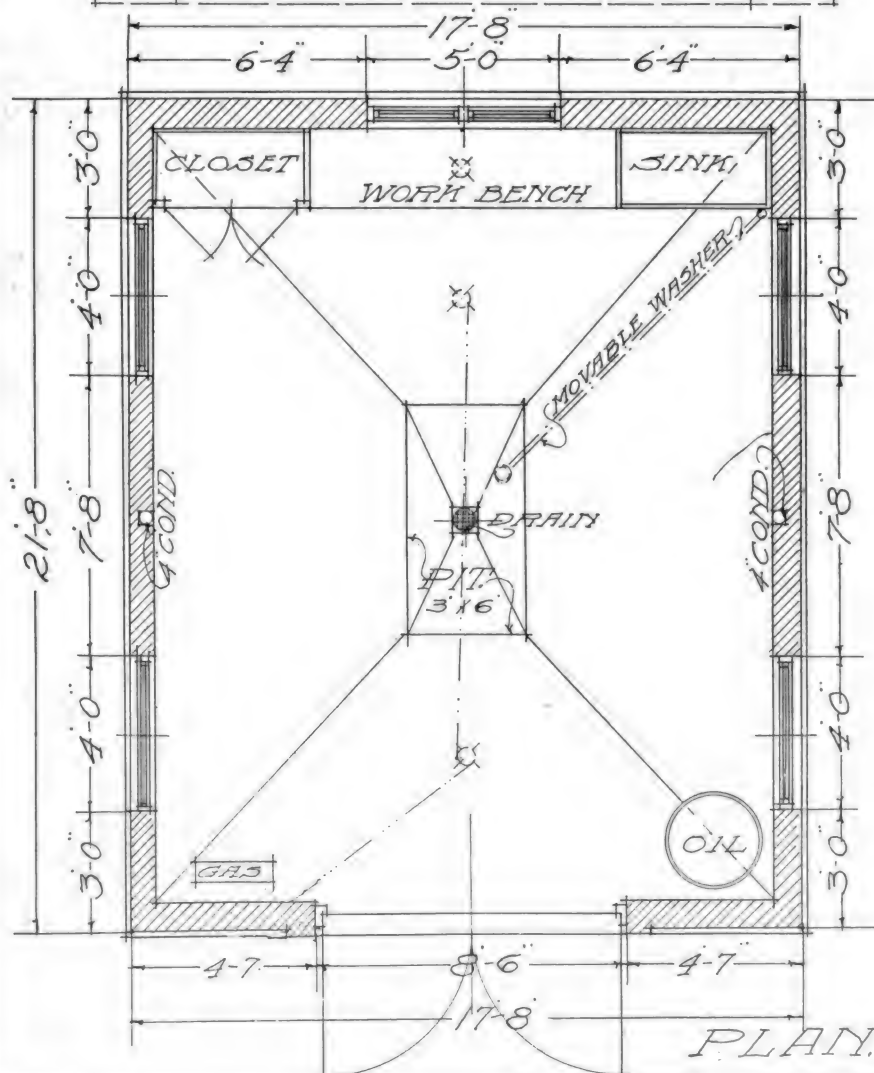
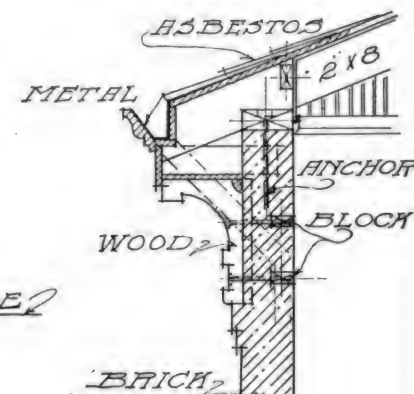
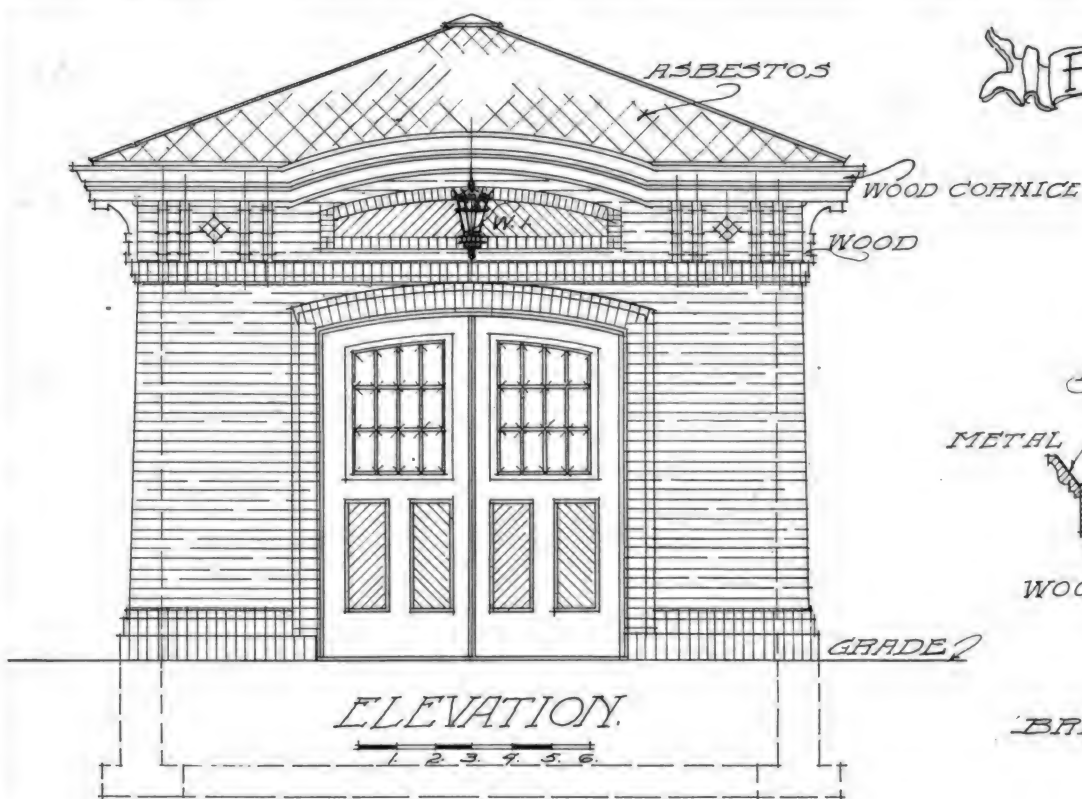
The roof timbers are of 2x8 inch spruce, covered with a seven-eighths boarding, or roofers. Five-ply tar paper is recommended as a bedding for the asbestos shingles. Artistically, these shingles give a striking effect when laid, as shown in the front elevation, in the diamond pattern. They may be obtained in the general market in several colors, and green or gray are recommended as good combinations when used in connection with red brick walls. The roof is drained by two four-inch conductors, one on each side of the building, placed equi-distant in the wall.

Special attention has been given to the lighting of this garage. The windows are spaced so that no matter what part of the car a man may be working on when it is placed over the centred pit, the light is the same, by plan. This principle also aids from a standpoint of ventilation. The lighting of the garage by night is as shown, several electric outlets being placed at points of vantage. The light switch is handily placed at the left of the entrance, just within the door.

Many advantages are secured in the arrangement of interior equipment. Along the rear wall is a work bench, placed in a well lighted position immediately under the window, while at the left there is a handy closet, closed with double doors, in which tools and supplies may be kept. From the water connection at the sink, on the right of the work bench, a movable washer arm extends pitward. This is a uniquely designed fitting, which, by its elevation, allows of the washing of the car, with convenience and dispatch, by the use of only a short hose length the operator being able to direct a stream easily on all sides of the car.

In this design it is taken into consideration that heating, as a rule, is capable of being furnished from the main plant in the house. A special heating plant would, of course, mean added expense and no better results, in all likelihood. Wall radiation is the most practical, the pipe system being commonly used. Due to labor and fluctuations in prices of materials, it is fair to say that this garage may be built for approximately \$900, exclusive of heating.

PLATE IV





ILLUMINATED RADIATOR FLAG.

Now that the feeling of real war is sweeping over the country, automobile drivers and owners insist on flying the American flag from their cars. Up to the present time most any crack or crevice in the front of the car, into which a flag stick could be put, has been pressed into this patriotic service.

This practise has not been altogether satisfactory on account of the constant whipping of the flag while the car is in motion. The flag must be put on securely to give satisfaction.

The producers of the Howe Spotlight have introduced a specially made illuminated radiator flag, with carrier, that can be attached to any radiator cap. The upright or pole is made of nicked tubing, 12 inches high. Through the tubing the light cord is brought to the light on the top of the upright. The light, which is necessarily a small one, is protected by a highly polished nickel plate deflector—shaped so that the light rays are put on the flag, yet no direct rays reach the driver. The flag is six by eight inches, of high grade silk, with ends protected so that they will not whip out easily. The upright is held securely by a universal clamp, which permits the removal of the radiator cap without disturbing the clamp.

The clamp will serve as an ordinary flag holder and may be purchased separately.

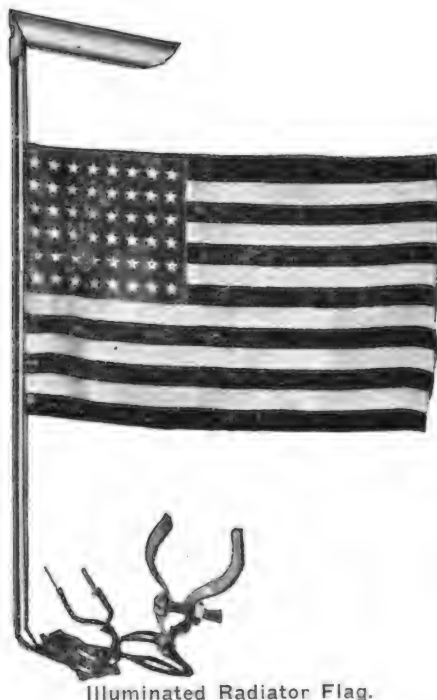
Made by the Howe Mfg. Co., Chicago, Ill. Price for complete outfit, \$1.25; without bulb, \$1; for clamp alone, 35 cents.

ELECTRIC GLUE POT.

An accessory which is bound to be of much value in any garage is known as Mabey's electric glue pot. This glue pot is said to be extremely economical, due to the fact that the consumption of current is kept down to a minimum because the insulation prevents loss of radiation. The fire hazard, which should be kept down in a garage, is eliminated by this form of heater.

The heat retaining jacket is constructed of heavy ingot iron, finished in black enamel, with copper glue cup and wiping rod. Each pot is supplied with a six foot cord, plug and three-heat switch for 110 volt circuit. It is made in four sizes from one to four quarts capacity.

Manufactured by Mabey Electric and Manufacturing Co., 968 Fort Wayne Ave., Indianapolis, Ind. Write for prices.



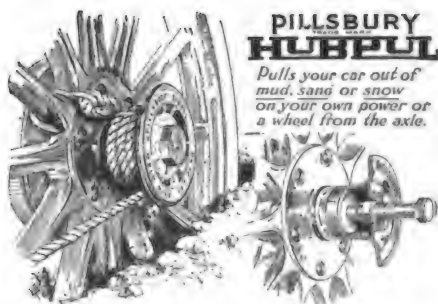
Illuminated Radiator Flag.



Fawasco Combination Cleaner.



Mabey Electric Glue Pot.



Pillsbury Hubpul.

FAWSCO COMBINATION WRENCH.

To lengthen your arms is seemingly a physical impossibility, but when taken as an advertising slogan in connection with a tool which gives the same result, it seems fairly appropriate. Many shirts and coats have been ruined by owners of Ford cars trying to reach under their car to test the amount of oil in the crank case. The tool illustrated herewith is just as effective as one's fingers and saves the annoyance and cuss words. It is a combination gasoline gauge, oil cock wrench and cleaner; and the claim is made that it will not only measure the gasoline in the tank, but provide the only sure means of learning whether there is oil in the crank case, as the pin will prove if the oil cock is stopped up or the oil exhausted. It is made of nickel plated, coppered, Bessemer steel rod, with a very high class finish.

They are put up in complete packages for the convenience of the trade and dealers are furnished with a very handsome counter display card, upon which is mounted one of the tools, which helps considerably in their sale.

Manufactured by J. H. Faw, Inc., 41 Warren St., New York City. Retail price, 35 cents.

PILLSBURY HUBPUL.

Uncertainty as to road conditions will encourage the average car or truck owner to provide himself with a means of extricating his machine should it get stuck. A device which is designed for such a purpose is known as the Pillsbury Hubpul, which consists of a combination hub cap, wheel puller and drum or device for pulling the car from mud, etc. It is easily attached to each rear wheel and utilizes the power of the automobile engine for effecting a dislodgment. A rope or cable is fastened to one of the wheel spokes, while the other end is anchored to a stake, pole, tree or other stationary object. When the engine is started the slipping wheels wind the cable over the drum and the car is gradually pulled forward. The strain on the engine is said to be very slight, on account of the large leverage obtained by the reduction through the reels or drums.

The device is finished in nickel or japanned and is made exclusively for Ford and model 490 Chevrolet cars.

Manufactured by Pillsbury Manufacturing Co., Minneapolis, Minn. Prices, \$4 japanned and \$6 nicked.

UTILITY VARNISH RENOVATOR.

A varnish renovator and cleaner, applied by the spray method, which is highly desirable both to the garage owner and car driver, is known as the Utility Varnish Renovator. The manufacturers claim that this cleaner will remove road tar, and that it contains no chemicals that will damage the finish in any way, being non-acid and non-alkaline.

The manufacturers make an attractive proposition to dealers and request that they write for particulars and special prices.

Manufactured by Poughkeepsie Utilities Corp., 36 Winnikee Ave., Poughkeepsie, N. Y.

LIBERTY FLAG HOLDER.

The new Liberty flag holder is a cleverly made little device for making possible the attachment of five flags to the radiator cap of an automobile. This device is so designed that the flags are held in front of the filler cap in a fan shaped arrangement. The holder is heavily nickeled and carries steel flag staffs, which are firmly secured in the holder. A special effort has been made to prevent the fraying of the flags, which are made of special silk and heavily stitched at the edges.

Manufactured by the Stanley Manufacturing Co., Dayton, O. Send for price.

THE GANT METER.

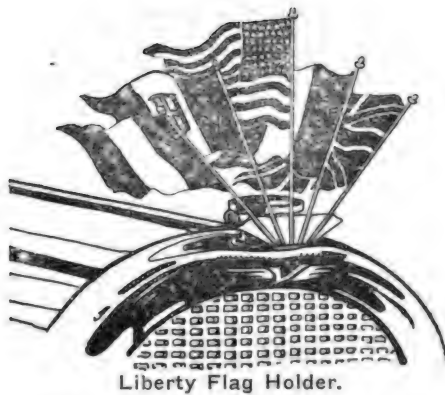
One of the small and often neglected wastes in a supply house is due to the fact that not enough care is exercised in measuring ignition cables and wiring. Inches soon add up to feet and mistakes mean money where secondary cable is concerned. The Gant meter is a device which is said to accurately measure any size of cable, rope or wire drawn through it from one-quarter inch to one inch in diameter. This device is strongly and compactly constructed, finished in green, with large gilt numerals.

Manufactured by the E. M. Gant Mfg. Co., Inc., Ethridge, Tenn. Price, \$5.

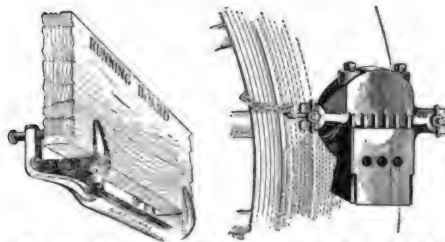
G-WIZ STEAM VULCANIZER.

A small portable steam vulcanizer is being introduced which is designed to vulcanize either tubes or shoes. It is a metal body partially filled with water at the factory and then sealed, in such a manner that it needs never be refilled. A small fire box, packed with asbestos, is filled with gasoline and when lighted furnishes enough heat to turn the water to steam, so vulcanizing the tire. In the G-Wiz, no flame is exposed, nor is there practically any smoke, the fire being controlled by draft holes. The complete outfit comes packed in a neat box with raw rubber, cement, directions and everything ready to start work, and weighs but three pounds.

Manufactured by the National Motor Supply Co., Cleveland, O. Price complete, \$1.50.



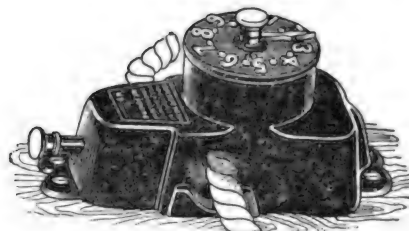
Liberty Flag Holder.



Above, Foot Scraper; at Right, G-Wiz Steam Vulcanizer.



Lawco Silencer.



The Gant Meter.



Action of Lennon Light Protector.



Utility Varnish Renovator.

THE LENNON LIGHT.

The United States Court of Appeals have just affirmed the patent rights to the Lennon light, which is a flexible brass reflector, heavily plated, by which the beams of light are thrown on to the road at the approved height from the ground, and prevented from causing the headlight glare which causes so many accidents and which is prohibited by statute in many states. This device is made in two sizes and will fit practically any headlight. It is light in weight and simple in construction, having no springs or extra parts to become broken.

Manufactured by J. H. Faw, Inc., 41 Warren St., New York City. Retail price, \$1 per pair.

FOOT SCRAPER.

Dirt and mud in the car detract from the comforts of riding, besides ruining the rugs. This is especially true of road oil, which is apt to stick to the bottoms of the shoes. To obviate this trouble the National Foot Scraper has been designed. This scraper is attractively finished in nickel plate and fastens to the running board with two clamps. With this device there is no necessity for boring holes for attachment. It pays for itself in cleanliness.

Manufactured by the National Motor Supply Co., Cleveland, O. Price, 50 cents.

LAWCO SILENCER.

A muffler which is said to eliminate back pressure and loss of power is now being put on the market under the name of Lawco Silencer. This silencer is designed for use upon any of the cars upon the market and comes complete with hangers and fittings ready for application.

Manufactured by the F. H. Lawson Co., Cincinnati, O. Price for Ford attachment, \$2.50. Write for other prices.

ADJUSTABLE HOLDER.

The illustration shows a handy and easily adjusted canteen or suit case holder, which may be attached to the running board of any car. This device is adjustable, so that in it may be carried practically any object eight inches wide and less than the length of the running board. Adjustment is secured by wing nuts, which are located on the top of the device. With every holder, which consists of two parts, is furnished a holding strap.

Manufactured by Leslie E. Moore, 1042 S. Olive St., Los Angeles, Cal. Price, \$2.25 per set.



Adjustable Holder.

HALLADAY STEERING WHEEL.

There is a great demand for an adjustable steering wheel for Ford cars for two reasons. First, because such a device permits access to the driver's seat without disturbing the occupant of the other seat; second, because steering is made easier by means of a larger diameter wheel or by corrugations on the wheel rim. The Halladay adjustable steering wheel is attached to the Ford car steering column by the removal of one nut and the steering wheel, and when in place may be folded back by the releasing of a catch on the underneath side. The wheel may be obtained in either of two sizes, 15 or 17 inch, and has either a plain or corrugated rim.

Manufactured by L. P. Halladay Co., Streator, Ill. Prices furnished upon request.

PLANCO FOLDING WATER BUCKET.

A most convenient and practical water bucket that may be folded and unfolded instantly or carried in the pocket, is known as the Planco Folding Water Bucket. This bucket holds over a gallon of liquid and is easy to handle when full.

Manufactured by the Planet Co., Westfield, Mass. Price, 75 cents.

J. H. TONNEAU SHIELD.

Through front windshields the occupants of the front seats of motor cars are fully protected from dust and wind by these shields. It is a logical deduction therefore that the same should be done for those in the rear seat, and such is made possible by the J. H. Tonneau Shield, which is made in two styles, one for a solid front seat, the other for divided front seats. The former has been previously described. The latter is somewhat similar, but is divided in the middle or composed of two small shields, one for each seat, which when opened give full protection, and by folding the two centre wings allows passage way to be used without any interference.

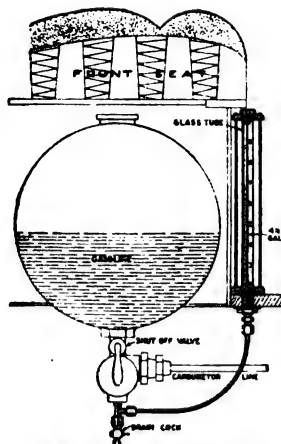
Manufactured by J. H. Tonneau Shield Co., 1777 Broadway, New York, N. Y. Prices upon request. State name of car when ordering.



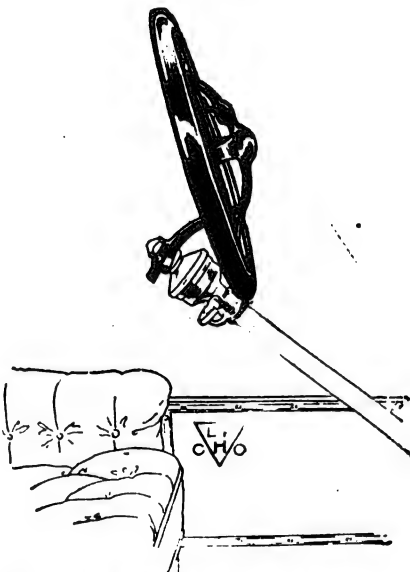
J. H. Tonneau Shield in Use.



3A Company Flag Holder.



National Gasometer.



Halladay Steering Wheel.



Folding Water Bucket.

3A COMPANY FLAG HOLDER.

There is a great demand for an inexpensive flag holder that will fit practically any automobile, and it is claimed that the 3A Company Flag Holder meets this demand. This flag holder is made of polished nickel plated steel and clamps around the radiator filler pipe of practically any car. Each device is supplied with a lock washer and bolt.

Manufactured by American Automobile Accessories Co., Cincinnati, O. Price, 25 cents.

NATIONAL GASOMETER.

Have you often wondered just how much gasoline you had in your Ford car tank, yet didn't want to go to the bother of removing the cushion, tank cap and measuring the gasoline height? If your car is equipped with a National gasometer you will not be put to this bother. This measuring device is designed for attachment to the lower part of the standard Ford gasoline filter fitting and requires no alterations to apply. The gauge is mounted on the floor board, directly in front of the seat. The gasoline level can be told at a glance.

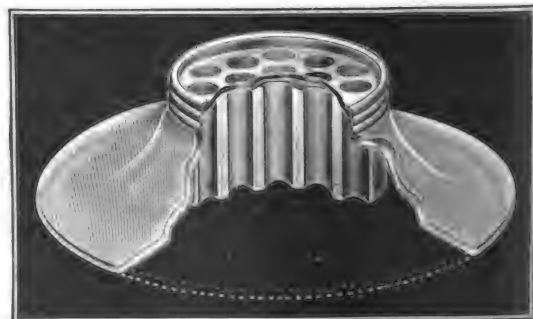
Manufactured by the National Motor Supply Co., Cleveland, O. Price, \$1.50.

WAY-A-HEAD LIGHT.

The Way-A-Head auto lens, as the name indicates, is designed to concentrate sufficient light on the road way ahead of the car to make riding in the country safe. It is said that typewritten matter may be easily read by the light of this lens at a distance of 400 feet. To accomplish this result the light is guided and controlled by means of 19 long, narrow holes, formed through the body of glass in the lens. Each hole acts as a telescopic tube in passing a narrow beam of light with very restricted spread. For nearby light the centre hub or group of holes is surrounded by a bowl shaped disc of glass, formed in one piece with the center nozzle, with all of its surface frosted, making the softest possible light, yet illuminating both curbs of the street.

A polished plate glass cover, held in place by means of a nickel plated ring, is provided to keep dirt out of the holes.

Manufactured by Way-A-Head Light Co., Pittsburg, Pa. Prices ranging from \$5 to \$6.50, according to size.



Way-A-Head Light.

INNER TUBE CASE.

There are a number of important factors to be considered in the preservation of spare inner tubes that the average motorist is prone to forget. The life of rubber is materially shortened by exposure to light, moisture to a certain degree, oil or gasoline. Tubes thrown carelessly into a tool box depreciate very rapidly and are often rendered worthless by frictional contact with sharp edged and pointed tools. The Martin inner tube cases, which are made for either one or two tubes are of water proof enameled cloth and offer protection against light as well as abrasion. They offer a practical solution to the exposure problem and pay for themselves by preserving tubes and saving the patients of the autoist.

Manufactured by the Martin Manufacturing Co., Lancaster, Pa. Price for single tube case, 35 cents double case, 50 cents.

CLEANABLE COLLARS.

Every motorist at some time or other has been put to the embarrassment of having to wear a collar that has become grease or dirt spotted because of road repairs. Such motorists will appreciate the Challenge branch of Cleanable Collars. These collars are made of a high grade cotton fabric, with stitched edges, and given the same dull linen finish as ordinary collars, they are then water-proofed. These collars are easily and quickly cleaned with a damp cloth and soap and may be obtained in standard half sizes and many styles.

Manufactured by the Arlington Co., 725 Broadway, New York, N. Y. Write for prices and catalogue of styles.

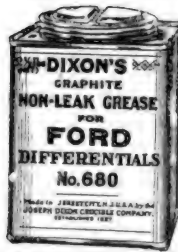
DUPLEX FOLDING BASKET.

Conservation of room is the first thought of the motor tourist, who does not care to burden the machine with very many bulky articles. The illustration shows the Duplex folding handy basket, which is made of brown canvas, water proofed, in which may be carried liquids or solids equally well. It is reinforced with spring steel, rust proofed ribs and equipped with double handles and snap hooks for the covers. For campers, fishermen and auto picnics they are ideal, as they may be compactly folded and stowed away under the seat.

Manufactured by the Planet Co., Westfield, Mass. Prices, \$2 and \$2.50.

THE LEPPER MANIFOLD HEATER.

"The problem of low test gasoline and kerosene oils in an internal combustion engine can be solved by the proper application of heat to the carburetor or intake" is the thought which was brought out in a paper recently read before the S. A. E. The Lepper Manifold Heater is a device which is designed to be inserted in the intake manifold of a gasoline engine. This device looks similar to a



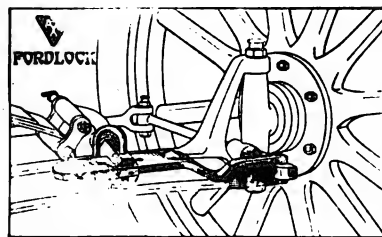
Dixon's Non-Leak Grease.



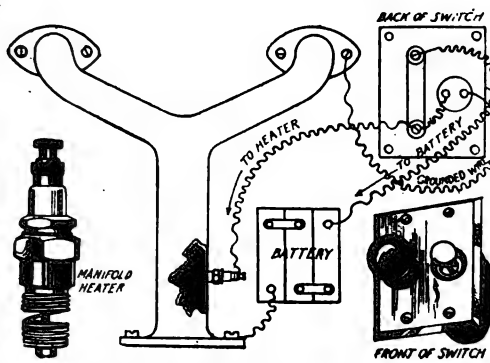
Duplex Folding Basket.



Martin Inner Tube Case.



The A-Y Fordlock Applied.



The Lepper Manifold Heater.

spark plug and is connected through a switch with a storage battery. When it is desired to start the car the switch is turned on and the current passes through the heater, causing the heater coil to give off heat, thereby vaporizing the gasoline as it is drawn into the engine.

Manufactured by the Lepper Mfg. Co., 101 North Federal Ave., Mason City, Iowa. Price complete with cord and switch, \$7.50.

DIXON'S NON-LEAK GREASE.

The motorist is frequently faced by the problem of grease exuding from the rear axle to the brake bands and wheels of his car. This excess grease not only detracts from the appearance, but also produces a danger element, in that the lubrication of the brake bands prevents their proper functioning. The manufacturers claim that Dixon's No. 680 non-leak grease solves this difficulty. It is composed of selected flake graphite, thoroughly mixed with a special adhesive lubricant.

Manufactured by Joseph Dixon Crucible Co., Jersey City, N. J. Write for booklet and dealer's proposition.

A-Y FORDLOCK.

The illustration shows the A-Y Fordlock as it is applied to a Ford car. This locking arrangement is applied to the steering spindle and front axle of the car, and when locked into place, keeps the wheels in one of three positions: Straight ahead, as shown, at the left, or at the right. The locking rod is made of heavy steel; the padlock itself of standard design. Though it would be nearly impossible, and very impractical, to tow the car any distance without removing the lock, it could easily be moved a short distance in case of fire, or to relieve traffic congestion.

Manufactured by Angsten-Koch Co., Princeton Ave., Chicago, Ill. Price complete with Corbin lock, \$3.50.

TWO NEW APCO PRODUCTS.

The Apco Mfg. Co., formerly the Auto Parts Co., is marketing two new specialties for the Ford car, a horn button attachment and a flag holder. The horn button attachment should appeal to the Ford owner, as it enables the operation of the Ford electric horn, without removing the hands from the steering wheel. The button is designed to be applied to the centre of the wheel and can be attached in a very few minutes.

The Apco flag holder is designed to carry three flags in such a manner that they are displayed to the best advantage. The flag staffs are so crossed that the middle flag can be well displayed, and the holder can be easily attached to the filler tube.

Manufactured by the Apco Mfg. Co., Providence, R. I. Price for horn button, 25 cents; flag holder, 25 cents.

RIM DECISION RELIEVES INDUSTRY

Abrupt Termination of Perlman Suits a Notable Incident in the Annals of Automobile Litigation

OF ALL the litigation that has been incident to the development of the motor car industry, none has proved so spectacular or theatrical in its climax as that of the suit to establish the validity of the Perlman rim patents, which collapsed last week, not even excepting the famous Ford-Selden case, in which Henry Ford freed the industry of the claim of a basic patent covering the internal combustion engine. The Firestone Tire and Rubber Company was defendant in the Perlman suit.

The entire automobile industry was disturbed and their output seriously threatened. The automobile manufacturers who were receiving their rims from the Standard Welding Company made arrangements with the Perlman Rim Corporation to release sufficient rims for them so they could make deliveries, for which they paid thousands and thousands of dollars. The first check from one company was for \$40,000. Most of the rim manufacturers submitted and turned their rim plants over to the Perlman Rim Corporation.

The injunction was first argued for in New York before Judge Mayer on April 13 last. By that time Perlman's opponents had gathered new evidence showing that the decision in the former suit had been obtained through false testimony and asked that they be given an opportunity to present these facts in trial in open court. On this showing an injunction was denied Perlman and the case set for June.

At the trial last week, Perlman was put on the stand and testified to a completion of his invention in 1903, introducing exhibits and documents alleged to substantiate his claims. During the cross-examination of Perlman he was led into contradictions and evasions and after several hours questioning facts were brought out as to Perlman's business activities which finally culminated in disclosures made to the court of the arrest of Perlman in England for fraud and deceit, a jail term and flight from England while on bail.

Perlman would not admit or deny the facts presented to him, but declared, "I have no recollection" to the various accusative questions.

The thing of importance to car manufacturers and the public is that the outcome of the suit has stopped a useless drain of millions of dollars previously fastened on the industry.

At a meeting of the directors of the Perlman Rim Corporation held following the collapse of the case, L. H. Perlman was removed from the position of president of the company and as a director.

The Perlman Rim Corporation is owned and controlled by the United Motors Corporation, which alone owns five other

well known large manufacturing concerns that make parts for automobiles. It is understood that the Perlman Rim Corporation will adopt a cooperative policy in relation to the automobile industry as a result of the situation

that is created by these decisions.

The Perlman corporation received another adverse court decision a few days after the collapse of the suit against the Firestone company when United States Judge Manton upheld Louis F. Munger's claim that a patent filed by him in 1899 was being infringed by the Perlman corporation and ordered payment to the plaintiff of royalties. The Perlman corporation was ordered to account for all its sales of the infringed patent before a special master, who will fix the amount of the royalties to which the inventor may be entitled.

COOPER WINS CHICAGO DERBY

THE third annual Chicago Derby, run at the Chicago Speedway on June 16, was won by Earl Cooper in a Stutz. He covered the 250 miles in 2:25:28.8, or an average speed of 103.1 miles an hour. His time was one minute and 11 seconds below the record set for the track by Resta in last year's contest.

Ralph Mulford, in a Hudson, crossed the tape at 2:26:11.3, or 42 seconds behind the winner, and Clifford Durant finished in his Delage in 2:26:36.43, two minutes behind Mulford.

It was one of the most successful and entertaining meets ever held and the gate for the first time was sufficient to defray expenses. A non-professional race, free-for-all, of 100 miles, was won by Dr. Percy Ford in a Haynes car at an average speed of 89 miles per hour. There was also a mimic battle in which a real tank participated, bomb dropping demonstrations by military airplanes and a programme of athletics.

One of the features of the day and the big race, however, was the appearance for the first time of Barney Oldfield in his "submarine" racer. It did not prove

as formidable, however, as it appeared, dropping out about 40 minutes after the race started with mechanical trouble.

Two new world's records were set by Mulford, who would undoubtedly have won first place had he not been obliged to make a stop 15 miles from the finish. His time for 150 miles and 200 miles was faster than that established as a record by Aitken at Sheepshead Bay last year. He covered the 150 miles in 1:26:14.9, and his time for 200 miles was 1:55:15.6. Twenty-seven cars started and 11 finished. The cars crossed the tape in the following order:

Driver	Car	Time	M.P.H.
Cooper....	Stutz	2:25:28.8	103.15
Mulford...	Hudson	2:26:11.03	102.62
Durant....	Delage	2:26:36.43	102.04
Hearne....	Duesenberg	2:27:48.03	101.52
Haines....	Mercer	2:30:56.43	99.39
Henderson	Duesenberg	2:33:07.95	98.09
Lewis....	Hoskins	2:35:07.07	97.60
Vail.....	Hudson	2:39:03.00	94.31
Chevrolet.	Frontenac	2:40:08.86	93.67
Fontaine..	Mercedes	2:42:23.90	92.63
De Palma..	Packard	2:43:08.76	91.95

COMING EVENTS

RACING CONTEST SCHEDULE.

Benton Harbor, Mich., track race....	July 4
Omaha, Neb., speedway race, championship	July 4
Spokane, Wash., track race.....	July 4
Tacoma, Wash., speedway race....	July 4
Uniontown, Pa., speedway race....	July 4
Visalia, Cal., road race.....	July 4
Rochester, N. Y., hill climb.....	July 14
Missoula, Mont., track race.....	July 15
Buffalo, N. Y., intercity reliability....	July 17-19
Anaconda, Mont., track race.....	July 22
Great Falls, Mont., track race....	July 29
Billings, Mont., track race.....	Aug. 5
Flemington, N. J., track race....	Aug. 17
Uniontown, Pa., speedway race....	Sept. 3
Cincinnati, O., speedway race, championship	Sept. 3
Red Bank, N. J., track race.....	Sept. 6
Pikes Peak, hill climb.....	Sept. 8

Providence, R. I., speedway race, championship	Sept. 15
Allentown, Pa., track race.....	Sept. 22
Trenton, N. J., track race.....	Sept. 28
New York, speedway race, championship	Sept. 29
Danbury, Conn., track race.....	Oct. 6
Uniontown, Pa., speedway race....	Oct. 6
Richmond, Va., track race.....	Oct. 13
Chicago, speedway race, championship	Oct. 13
New York, speedway race.....	Oct. 27

SHOW CALENDAR.

Fremont, Neb., tractor demonstration	Aug. 6-10
Spokane, Wash., interstate fair..	Sept. 2-9
Milwaukee Show, State Park Fair, West Allis	Sept. 9-15
Dallas, Tex., Auto and Accessory Dealers' Association State Fair..	Oct. 23-28



Under the Liberty Bond Clock at the White Motor Company, Cleveland, O.; the American Workingman Proves the Spirit That Is in the Automobile Industry When the Country Faces a Crisis.

The Business Side of the Motor Vehicle Industry

What Several of the Leading Car and Parts Makers, Production and Sales Organizations, and Allied Lines Are Doing or Have Under Consideration.

The Premier Motor Corp., Indianapolis, Ind., recently received an order for 12 cars for immediate shipment to Japan and an order for six others for shipment to Spain. One of the machines going to Japan is for the Mikado's personal use, while one of those going to Spain will be used by King Alfonso.

The White Motor Co., Cleveland, O., rallied employees under a Liberty Bond clock, with the result of workmen's subscriptions to the great loan in those shops totaling more than \$200,000.

The Permalife Storage Battery Co., Inc., Poughkeepsie, N. Y., which is a merger of Permalite and the W. L. Battery Co., announces having secured for life the services of Frederick Wright, who has a record of notable success in storage batteries. In the preceding issue of the Automobile Journal announcement was made of the new name and plan of this national storage battery exchange system.

The Nurdyke & Marmon Co., Indianapolis, has engaged the services of David L. Gallup, professor of gas engineering at Worcester Polytechnic Institute, Worcester, Mass., and president of the automobile club of that

city. He will establish a research department at the plant and will act as consulting engineer until Sept. 1.

The United Line Service Corp. distributors of United trucks and tractors in the New York territory have moved into their new sales room and service station, recently erected at the corner of 11th avenue and 50th street, New York City. The new service station is 100x500 feet and is thoroughly equipped with the latest machines and devices for the maintenance and care of motor trucks.

The Stanley Motor Carriage Co., Newton, Mass., has declared the regular preferred stock dividend, at the rate of seven per cent. per annum, payable July 1 to stockholders of record of that date. During the past six months the deliveries of Stanley steamers have shown an increase of 200 per cent. over the corresponding period last year.

The Prest-O-Lite Co., Inc., Indianapolis, Ind., have appointed the following individuals and concerns as official battery service stations for the Prest-O-Lite batteries: Oldsmobile Company of Vermont, Barre, Vt.; Auto Electric Service Co., 867 Woodward Ave., Detroit, Mich.; A. G. McPherson, Park and St. John Aves., Highland Park, Ill.; Kankato Bat-

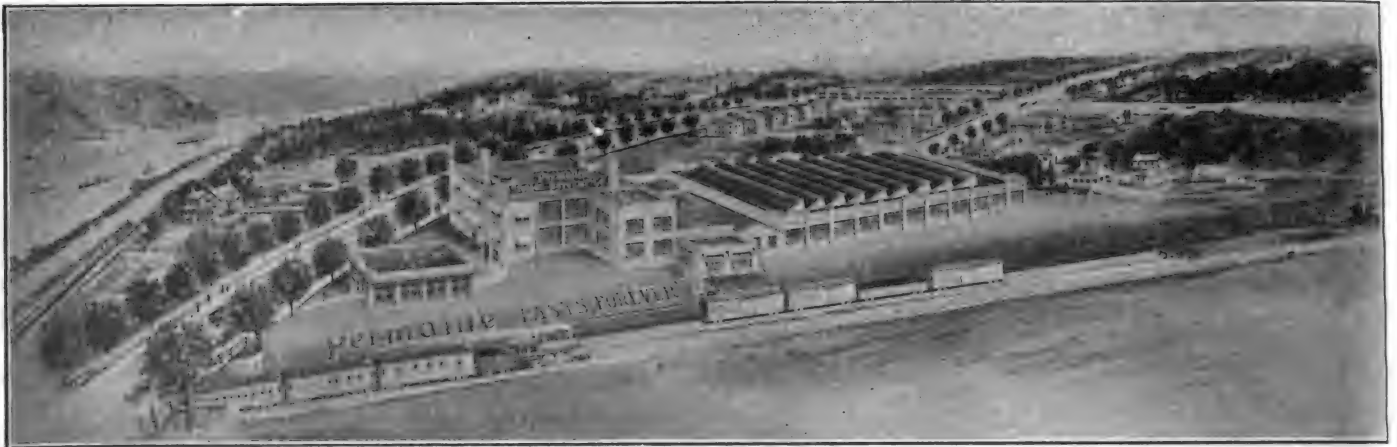
tery and Supply Co., 510 S. 10th St., Kankato, Minn.

The Wallace C. Hood Service Bureau, Detroit, Mich., has been appointed supervisors of distribution of the "Auto Spin Flag" for the entire world. The Auto Spin Flag Co., New York City, which manufactures this accessory, also makes a cluster, consisting of the American, British and French flags, beautifully lithographed on metal.

The Maibohm Motors Co., Racine, Wis., is installing machinery for the building of automobile bodies, including wood and metal working machinery, drying ovens, an upholstery department and a new power plant. Production at present at the plant is confined to the Maibohm sporting roadster, but when the extra equipment has been installed additional body types will be announced.

The Campbell Transmission Co. has been organized at Buchanan, Mich., and is erecting a plant in that city to cost \$25,000. Officers of the company are: President, L. L. Campbell; vice president, L. J. Campbell; secretary, C. B. Heineman.

The Quickwork Co. has been organized at Detroit, Mich., with a capital of \$400,000 to take over and operate the ma-



Birdseye View of Large, Modern Plant of the Permalife Storage Battery Co., Poughkeepsie, N. Y., Recently Consolidating the Permalife Corporation of Indianapolis and the W. L. Battery Co. of Poughkeepsie, N. Y.

chinery business of H. Collier Smith Company of that city, makers of automobile parts. Officers of the company are: President, H. Collier Smith; vice president, H. E. Groves; secretary and treasurer, A. F. Smith; production manager, W. J. O'Leary; director of sales, W. W. Prigg; engineer, Harry G. Smith.

The Ben Hur Motor Car Co., Willoughby, O., has been placed in the hands of Charles P. Moore of Cleveland, who was appointed as receiver for the company. The company's difficulties are said to

made as a means of raising the necessary \$1,000,000,000 instead of the complex and intricate method of taxation now being considered.

The Alter Motor Car Co., Plymouth, Mich., has been declared bankrupt by Judge Arthur J. Tuttle. Lee E. Joslyn, referee in bankruptcy, has charge of the disbursement of the assets.

The Nurdyke & Marmon Co., Indianapolis, Ind., is erecting a new factory with a floor area of 50,000 square feet which will be used for manufacturing airplane engines. The company was recently given a contract for the manufacture of 1000 Hall-Scott engines to be delivered to the government within the next few months.

The Swedish Crucible Steel Co., Detroit, Mich., has issued a revised schedule of prices for the Olson units and equipments, which became effective on June 15. The list is as follows: No. 1000, three-leaf, 1000 pounds capacity, \$30; No. 1250, four-leaf, 1250 pounds capacity, \$32.50; No. 1500, five-leaf, 1500 pounds capacity, \$35; No. 1750, seven-leaf, 1750 pounds capacity, \$40; extensions, 24 and 30 inch, \$55; No. 2, wood, 2000 pounds capacity, \$85; No. 4 wood, 1800 pounds capacity, \$85; No. 5, wood, 2000 pounds capacity, \$85; No. 2 units equipped with external service brake, \$25 extra; tires for wheel sets, when purchased with complete units, will be furnished at \$55 net per pair. Prices are f. o. b. Detroit or Chicago.

The Stutz Motor Car Co. of America reports earnings of approximately \$600,000 for the first six months of the present year, estimating the earnings for June, which compares with \$649,042 net profits for the entire calendar year of 1916. The officers of the company for the ensuing year have been re-elected with the exception of George H. Saylor, the treasurer, who has been succeeded by W. N. Thompson. An executive committee was appointed, composed of Harry C. Stutz, Allan A. Ryan and Sherburne Prescott.

The Beggs Motor Car Co., Topeka, Kan., has been organized with \$1,000,000 capital to manufacture motor cars. Earl Akers of Topeka has been elected treasurer.

The Maxwell Motor Co. made net earnings in May of \$1,100,000, and it is estimated that for the year ending July 31 the company's profits will be from \$1,000,000 to \$1,500,000 larger than the year before.

The Geronimo Automobile Manufacturing Co., Wichita, Kan., has started construction on a new plant which will be 300x100 feet and will have an annex 40x60 feet.

The Fisher Body Corp. for the year ending April 30, 1917, reports net earnings from operations of \$2,876,407, after deducting all expenses, depreciation, etc.; interest on floating debt, \$98,619; net income, \$2,779,787. Deducting from net income \$615,043, the proportion of earnings accrued to Aug. 21, 1916, date of inception of Fisher Body Corp., the balance of \$2,164,745, is net income of the corporation for eight and one-third months period from Aug. 20, 1916, to April 30, 1917.

The Day-Hamlin Mfg. Co. has been formed at Jackson, Mich., with a capital of \$50,000 and will manufacture tractors and tractor parts.



Charles Clifton, President Pierce-Arrow Motor Car Corp., Re-Elected Head of N. A. C. C.

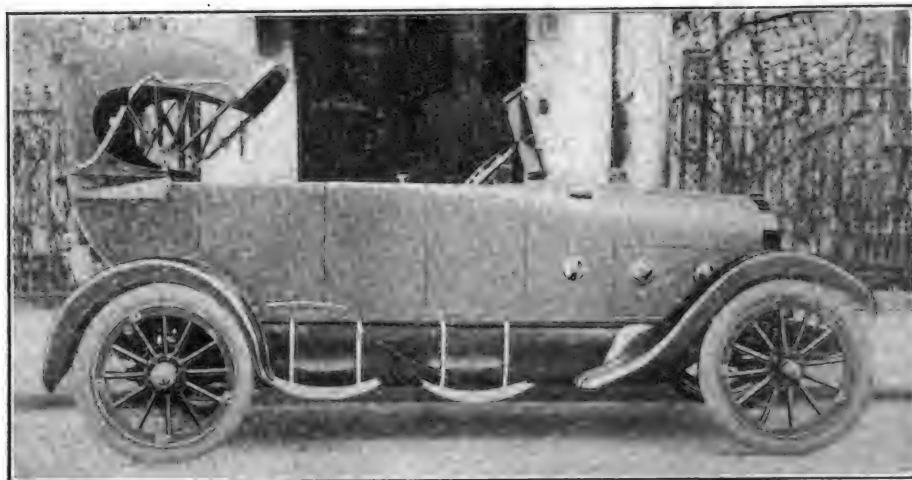
have arisen from the inability to obtain manufacturing materials.

Charles Clifton, head of the Pierce-Arrow Motor Car Co., was re-elected president of the National Automobile Chamber of Commerce at the annual meeting, which was attended by representatives of over 90 different companies.

Horace De Lisser, chairman of the board of directors of the Ajax Rubber Co., during the recent tax discussion in Congress proposed to Chairman Simmons of the Finance Committee of the United States Senate that a general levy of one-half of one per cent. of the gross sales made by every business in the country, and to include fees and other emoluments received by professional men, be



Horace De Lisser of Ajax Rubber Co., Chairman of National Automotive Committee.



Carmm Tonneau Extension Unfolded, Making Touring Car Body of Foreign Lines and Distinctive Appearance.

BODY CONVERSIONS FOR 1918

American Motors Marketing Coach Which Folds and Unfolds as Roadster or Touring Car

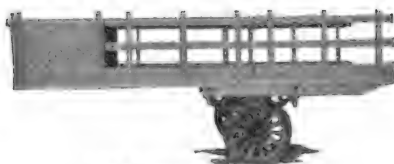
OF THE hundreds of body innovations introduced in the past few years, none has attracted the widespread attention that is being claimed by the new Carmm convertible body, which is being marketed by the American Motors, Inc., makers of the American Six.

This body, an invention of a native of Buenos Aires, can be converted in two minutes time into either a neat runabout or roadster type, or a touring body with seating capacity for seven passengers. The conversion is simple and does not require any extraordinary apparatus or fixtures that distort the lines of the body, which is of the full stream line type, and when set in either type has nothing to distinguish it from the regular bodies except the individual steps in place of a running board.

FRUEHAUF ANNOUNCES HINTS ON TRAILERS.

The Fruehauf Trailer Co., Detroit, in announcements calling attention to the rapidly widening use of trailers, shows that the purchase of a single trailer is invariably followed by the ultimate equipment of the owner's entire delivery system with them, and the wide range of industries in which trailers can be used make the trailer agency lucrative. The Fruehauf semi-trailers are made in four capacities, four, six, eight and 10 tons, and on account of their substantial motor truck construction have given exceptional service even in the most gruelling work. Timken bearings, heavy channel steel frame, sturdy artillery wheels with solid truck tires and special springs make up the more important units of the Fruehauf trailer. As the transportation of materials becomes more complex the heavy duty trailer becomes more and more a necessity. A one-ton truck can

easily pull a Fruehauf trailer carrying from four to six tons without the slightest excessive strain. Owners of light trucks have successfully solved their problem of heavy hauling by the use of semi-trailers without the added investment of heavy duty trucks.



The Fruehauf Trailer.

KANT-LEEK WASHERS' TO CURE LEAKY AXLES.

Grease on hubs and wheels is not only unsightly, but a good collector of dust and dirt. Grease and oil on tires shortens their life by causing rapid and unnecessary decay. Brake linings which are soaked with grease soon become ineffective, thereby rendering the car dangerous. The Kant-Leek Washers are designed for application to the Ford car rear axle, and are said to positively prevent the leakage of grease from the differential housing to the wheels. The set of washers consists of four annealed steel cups, which with eight special oil-



Kant-Leek Washer Assembly.

resisting Hardifelt washers and retaining ring, when properly assembled on the axle shaft, makes the action sure. The application is simple and takes but little time. Manufactured by Apex Mfg. Co., 1901 Locust St., St. Louis, Mo. Price 75 cents per set, complete in carton.

FORD ACCESSORIES SHOW TO BE HELD IN CHICAGO.

A series of shows at which Ford accessories will be exhibited exclusively is being planned by an organization to be known as the National Exposition of Ford Accessories.

The shows will be held under the management of H. V. Buelow, Toledo, O., who has opened an office in the New Southern Hotel, Chicago, where the first of the shows is to be held.

A permanent membership fee of \$100 is to be charged and it is expected that practically all of the 300 odd makers of Ford accessories will enroll as members.

ILLINOIS PASSES THE GARAGEMEN'S LIEN LAW.

The Governor of Illinois has signed the "garagemen's lien law," which was recently passed by the Legislature, and which gives garagemen the power to possess, hold and sell cars on which bills have accrued and are not paid within a certain period. The Chicago Garage Owners' Association has been fighting for the passage of the bill for the past five years and has been aided in the campaign by the Garage Owners' Association of Illinois.

A-C PLUGS AT THE RACES.

A-C Plugs at the Cincinnati races on Memorial Day were used for equipment on four cars in the big race, all four of which finished. Vail, who ran second, used A-C Plugs, preceding all other cars equipped with American made plugs. In the dealers' race the Hudson, which finished first, and the Maxwell third, were equipped with A-C Plugs. This confirms the wonderful performance of A-C Plugs at Uniontown on May 10.

ACORN DIES AND HOLDERS.

An interesting 20-page booklet has just been published by the manufacturers of the Acorn Dies and Holders, the Greenfield Tap and Die Corp. of Greenfield, Mass. This little book is a historical description of their products and in it are contained a great number of facts dealing with dies, their repair and upkeep, that are well worth study.

MR. SPRINGER'S ADDRESS WANTED.

Inquiry has been made of the Automobile Journal by a subscriber in Trenton, N. J., who seeks to know the address of one John (or James) Springer, who left that city six or seven years ago, and, being of an inventive turn, became associated with the automobile industry in Detroit, Mich.

Simplification of Automobile the Problem

A Thousand Pounds of Car Required to a Single Passenger Too Much Weight President Dunham Tells S. A. E. at Notable Annual Meeting

PROGRESS and patriotism were keynotes of the annual meeting of the Society of Automotive Engineers at the national capital, June 25 and 26. Aside from the international aspect of the programme, through discussions on war machines, airplanes and tractors, by notable representatives of the foreign powers, the general purposes of American engineers in war service were made plain. President George W. Dunham made it clear that great improvements are called for in the passenger automobile as well.

design, building operation and maintenance of all forms of automotive apparatus. Their experience, therefore, is such as to make them invaluable in virtually every activity connected with the prosecution of the war.

"The work to be done by the S. A. E. members can be appreciated when we think of the thousands of motor trucks for transporting food, supplies and ammunition to our own troops and to those of our allies; the motorcycles that will be required for dispatch riders and motor truck companies; the passenger cars that will be needed for transporting officers and for innumerable other purposes; the airplanes we must build for

nature of its activities, perhaps to a greater extent than any of the other national engineering societies.

"A great deal of this governmental work has naturally been done through the Standards Committee of the Society, of which John G. Utz is chairman. The truck standards division of this committee spent almost a year in the formulation of specifications for Class A and Class B military trucks. This work was carried on in conjunction with the Motor Transport Board of the War Department



W. H. Vandervoort, Member of the Munitions Sub-Committee of the National Council of Defense.

This duty lies before the inventive genius of the country, it was explained, and the places of its expression will eventually be in the garages and machine shops of the land.

President Dunham's address, in its entirety on these valuable and instructive points, follows:

"For many years the Society of Automotive Engineers has met each June to discuss technical papers, transact routine business and renew old friendship by participating in affairs devoted to pleasure and entertainment. We now come together in the first meeting of the Society of Automotive Engineers, not for pleasure or profit, because such a purpose would not be fitting in these times, but in order that we may, at the centre of our national life, express our loyalty and allegiance as a society and as individuals to our government.

"In these times we as automotive engineers have a duty to perform. The members of the society, 3000 strong, and comprising practically all the leading automotive engineers of this country and many resident abroad, are experts in the



Howard Marmon, with Aircraft Engineering Division.

the training of thousands of aviators and for fighting at the front; the motor boats to be used for patrolling and averting the submarine menace; the tractors for moving field artillery; the farm tractors that must be built and put into efficient operation in order to feed the civilized world, and the many other power equipments that are necessary.

"It is only a year ago that the proposal was made for the merger of the automobile, aeronautic, tractor and marine engineers. The wisdom of this idea was quickly seen by the members of the various societies concerned and as a result the Society of Automotive Engineers came into being on April 19 last. In addition the National Gas Engine Association has voted that all its technical matters shall be taken up through a committee of the S. A. E., and many of the engineers connected with the N. G. E. A. company members are joining this society.

"The new and greater S. A. E. was formed that the government might be able to deal with one engineering organization instead of several, and that automotive engineering might be more rapidly advanced through better cooperation. The society has been given many opportunities to serve the government in the last few months, and because of the very



Maj. William Guy Wall, Who is to Design and Build Battle Trucks.

and with officers of the Quartermaster Corps. The completed specifications, which will be used in building the immense fleet of trucks necessary for the armies we will send abroad are a great credit to the members of the Truck Standards Division and of the Electrical Equipment, the Springs, the Engine and the Transmission Divisions of the Standards Committee.

"Other divisions of the Standards Committee have been in close touch with various departments of the government. The Aeronautic Division has been working with the Aviation Section of the Signal Corps, and with the Navy Department in the standardization of detailed parts for airplanes. Although the aeronautic industry is comparatively new, much has been accomplished by this division, and the work it is now doing is of such magnitude and importance that the division should have the undivided support of all, even those not directly interested. The Tractor Standards Division has brought about a new era of cooperation among the engineers of the tractor industry, who are already enthusiastically taking up the work of stand-

ardization. The division has also been in close touch with the U. S. Department of Agriculture in devising ways and means to increase food production. The Marine Standards Division has been most active in the standardization of parts in its field and much can be expected from it.

"A large number of members of the society have already entered the service of the government and many more are ready immediately they are needed. It is noteworthy that six past presidents of the society are taking prominent parts in government work. Past President Riker is a member of the Naval Consulting Board. Past President Coffin, who did efficient work in connection with the Industrial Preparedness Committee of the Naval Consulting Board, is a member of the Advisory Commission of the Council of National Defense. He is also chairman of the Aircraft Production Board.

"Past President Souther is the senior officer of the Aircraft Engineering Division of the Aviation Section of the Signal Corps, with the rank of major. Past President Marmon is doing engineering work with the Aircraft Engineering Division. Past President Alden has been made a major in the Ordnance Officers Reserve Corps. Past President Vandervoort is acting as a member of the Munitions Sub-Committee of the Council of National Defense.

"Former Vice President Zimmerschied is vice chairman of the Automotive Transport Committee of the Council of National Defense. Former Vice President William G. Wall is now a major in the Ordnance Officers Reserve Corps. Vice President Vincent has been doing work of the greatest importance in connection with aeronautic matters at the Bureau of Standards. The members of the council are spending a considerable part of their time at Washington and your president is the civilian member of the Board for Motorizing Field Artillery at the Bureau of Ordnance.

"The S. A. E. office, which has been established here in Washington, has kept in touch with the government departments, in order to be of service whenever possible. This service has been the supplying of names of men to act in various capacities and assisting the government to make the best use of the resources of the society. Many of our members will be required to do active duty of an engineering nature in the government service. Others, however, and it is likely that these will form a large proportion, will serve best by remaining at home in their usual occupations, and by spending all their energy in the production of vehicles and apparatus to supply the needs of the war.

"These members at home will naturally be able to assist in carrying on the general work of the society. The war will require even more rapid development of the industry than has been the case previously. More work must be done by the divisions of the Standards Committee. Engineering development must go on and it will be necessary to

present papers and discuss them in order to increase efficiency for war purposes of all types of automotive apparatus.

"To one familiar with the tractor industry the wonderful advancement from an engineering standpoint is obvious, but it must not be overlooked that the tractor is comparatively new and that it is going into hands unskilled in mechanical matters. There is great need of a strong movement to educate the consumer as to operation and maintenance, resulting in the elimination of much of the grief experienced in the early days of the automobile.

"We are prone to look upon the motor car as closely approaching its ultimate form, but those of analytical mind realize that there is much yet to do in the way of simplification. When one stops to realize that in the average use of the average automobile, about a thousand pounds of car is required to the single passenger, one must admit that we are far from having solved the proper construction from the weight standpoint.

"There has been a feeling that suitable engines for battle type airplanes cannot

be produced in this country. What can be done elsewhere certainly can be accomplished here. It must be the prime effort of the aeronautic engineering members to make this condition a reality.

"The motor truck engineers are to be congratulated on their accomplishments. much may be done by the still further getting together of the truck manufacturers, the truck assemblers and those engaged in the manufacture of engines, transmissions, axles and other parts, that a greater uniformity of construction may result in a still better mechanism which can be produced to better advantage."

The papers of the meeting included:

"Building Submarine Chasers by Standardized Methods," by Henry R. Sutphen; "The Farm Tractor as Related to the Food Problem," by H. L. Horning; "Design and Production of Aircraft in Wartime," by Wing Commander I. W. Seddon of the British Commission; "Classes and Uses of Battle Planes," by Lieut. Amaury de la Grange of the French Commission; "Fundamentals of a Successful Kerosene Burning Tractor Engine," by C. E. Sargent; "Lessons of War in Truck Design," by W. O. Thomas.

GO TO AIRPLANE MANUFACTURE

Lelands, of Cadillac Motor Car Company Leave Automobile Industry for Government Service

HENRY M. LELAND, president and founder of the Cadillac Motor Car Company, one of the best known and most successful throughout the whole industry, together with his son, W. C. Leland, vice president and general manager of the company, have resigned and will engage in the manufacture of airplanes for government service.

The Lelands will retain their financial interest in the Cadillac company, but will devote their entire time to the development of the airplane factory which it is

expected will be located some where in the vicinity of Detroit.

The Lelands are planning the construction of airplanes along scientific principles and it is expected that their product, like their motor car, will have few if any peers in its class.

Henry M. Leland has been abroad recently and while there made a careful study of the development of engines for airplanes. He also held consultations with several of the officials who are directing the Allies flying forces.



W. C. Leland.



Henry M. Leland.

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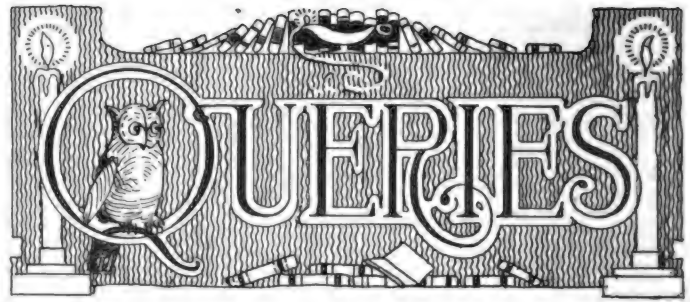
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NOTICE TO READERS.

THIS department contains the Mechanical Editor's answers to readers' inquiries. It is open to every subscriber. If any part of your car is not operating satisfactorily, or if you desire information regarding operating, maintaining or repairing motor cars, do not hesitate to lay your troubles before him. He will answer promptly and fully, either by mail or in these columns, as you direct. This service is free to every subscriber, and is often the means of saving considerable money that otherwise would be spent with a garage man. Letters should always be signed with the writer's full name and address, and the car or part in question should be properly identified, by mentioning the maker's name, model, year of production or other distinguishing feature. Address all inquiries to the Mechanical Editor.

THE AUTOMOBILE JOURNAL IDEA EXCHANGE.

For the benefit of readers of the Queries column it has been decided to conduct in this department a more widespread interchange of ideas. To this end the attention of readers is invited to the following question:

HOW DO YOU KEEP YOUR TIRES IN GOOD CONDITION, AND WHAT ATTENTION DO YOU GIVE TO SMALL CUTS, PUNCTURES AND SAND BLISTERS?

To the writer of the best answer to the above question \$2.50 will be paid. The best answer received will be published in the second issue after the appearance of the question in the magazine. Answers to the question should be in the hands of the editors by the 18th of July. The contest is open to every subscriber.

TESTING THE FORD CAR IGNITION SYSTEM.

(Mr. Geo. A. Welch, Milford, Mass.)

Best Answer to First Question.

The first requisite in testing out the Ford ignition system is to find out whether the magneto is furnishing current. Remove the spark plugs, turn on the headlights and crank the engine. If the headlights glow or burn brightly, it is an indication that the magneto is furnishing current. If there are no headlights, then, while the engine is being cranked, touch a wire that is connected with the magneto plug to the engine base, whereupon, if there is a spark, the magneto is furnishing current.

Having determined that the magneto is all right, the next logical step is to test the coils. Take out each unit from the box; examine the spring contacts in the box; clean the coil contact and vibrator points. Next test each unit by attaching wires from a four-cell battery to lower brass contacts and holding a hammer about one-quarter of an inch from the remaining contact. A spark from the contact to the hammer is an indication of sufficient secondary current.

The next point of trouble may be found in the wiring from the coil box to the timer. Look for loose connections at the terminals, broken wires inside the insulation, grease soaked covering, etc. In the timer itself, which should be removed, may be found badly worn terminals, worn timer roller, or broken or weak spring.

The high-tension wires being the only remaining part of the system, place the spark plugs, properly connected with their respective wires, on the top of the engine, in such a position that the electrode points, which should be about the distance of a worn 10 cent piece apart, are visible. Then crank the engine, noting whether there is a spark at each plug.

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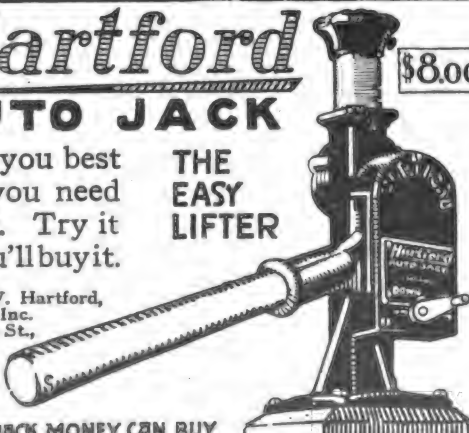
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PURCHASING A USED CAR.
(Mr. C. A. DuBois, Waltham, Mass.)
Best Answer to Second Question.

In testing a used car preparatory to purchasing, I would pursue the following course:

First. I would not consider a car unless it had been made by a reliable concern and there was a possibility of buying repair parts.

Second. I would get the lowest price and compare it with the general and average prices of cars of the same make and year, if possible.

Third. I would examine the frame and body to see if there were any breaks or cracks that might have been covered with grease or paint. Next I would have the engine started with the self-starter, in order to find the condition of the battery and whether the engine started easily or not. After the engine had been run long enough to get warm I would listen for valve tappet and timing gear noises. Next, short circuit each cylinder through the spark plug to detect connecting rod or wrist pin knocks.

Fourth. I would then examine water connections and radiator for leaks. Next turn the engine over with hand crank and note compression. Then jack up rear axle and spin wheels to see that they run freely, also note the amount of lost motion or play in the differential.

Fifth. I would give the car a road test of hill climbing, quick acceleration, good pulling power on high gear at low road speed. The car should be capable of being run as slow as five or six miles an hour on high gear on level ground. I would coast down an ordinary, smooth hill with gear lever in neutral and engine stopped, to test for rattles or noises.

Sixth. I would examine all wheels and see that they were in alignment and that there was no excessive play in either the wheels or steering gear.

Seventh. Finally, I would have the car weighed and be sure that it was equipped with the proper size tires to conform with the schedule given by tire manufacturers.

WELDING ALUMINUM.
(A. N., Dunkirk, N. Y.)

Will you please give me any particulars that you can upon the welding of aluminum?

The proper welding of aluminum presents a number of difficulties which are not encountered when welding many other metals. For this reason experience in working the metal is required before thoroughly satisfactory results will be obtained. An amateur, with a slight bit of care, is able to make an acceptable job of welding cast iron, but when he tries to weld aluminum he finds that the proposition is much more difficult.

The main difficulty that arises is due to the fact that the melting point of aluminum is comparatively low (1200 degrees), the neutral oxy-acetylene flame gives a temperature of approximately 6300 degrees, no matter what size tip is used; therefore, skillful manipulation of the blow pipe is necessary or holes will be burned in the metal. Though the melting point is low, the conductivity and specific heat of the metal are high. In other words, it is difficult to concentrate the heat and the metal is apt to melt over a large area.

To insure good work with aluminum, it is essential that all parts to be welded be absolutely clean. In most cases aluminum castings that are repaired have been in contact with oil or grease. To remove all traces of oil from aluminum takes some time, as the oil seems to penetrate into the metal. It is best to heat the casting slowly over a charcoal fire and carefully wipe away the grease as it "sweats" from the metal. In some cases, where the casting is smooth or surfaced, gasoline is a good cleaning agent.

Parts over one-quarter inch thick must be beveled exactly the same as in the case of cast iron. In most cases it is policy to preheat the casting. This may be accomplished with the use of a gasoline torch. As aluminum is very fragile at 900 degrees, care should be used not to exceed this temperature in preheating. A test of this, which is often used, is accomplished by touching the casting with a bar of half and half solder; as soon as the solder melts on touching the cast-

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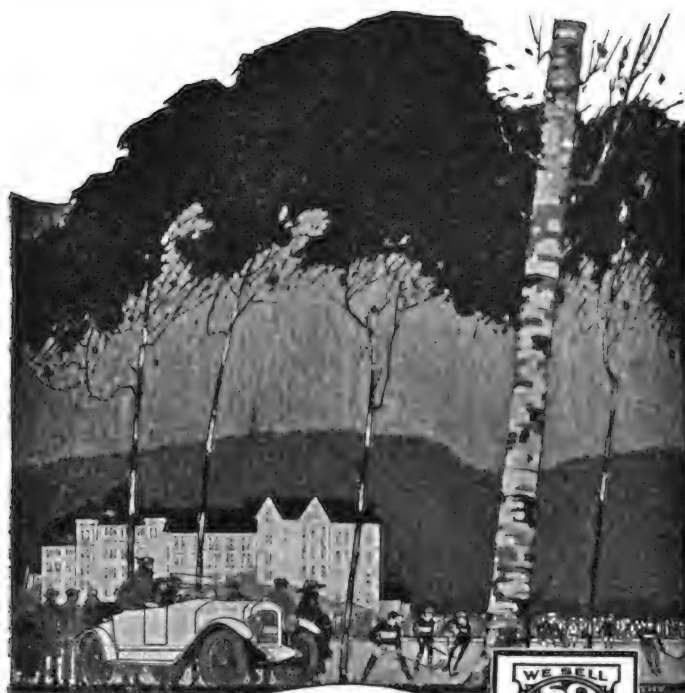
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ing, it shows that the work is sufficiently heated and ready for welding.

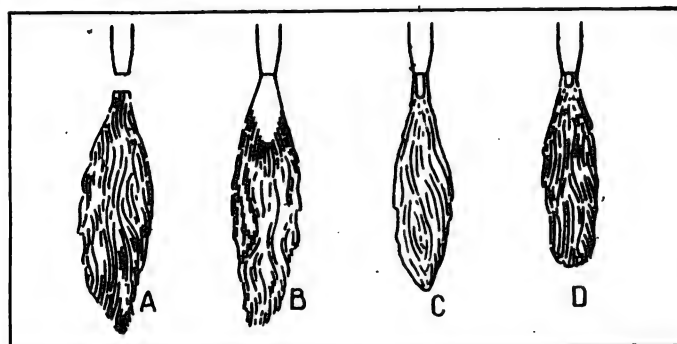
Between 900 and the melting point of 1200 degrees, the aluminum is extremely fragile. For this reason it is policy to place a sheet of paper on the underneath side of the casting, backing it up with fire clay and asbestos fibre until a firm support is obtained, which conforms with the shape of the casting. The paper will prevent the fire clay from entering the seam or break.

In addition to the mold, or fire clay backing, it is necessary to use great care in setting up and aligning the parts.

For a filling or welding material, a rod of approximately the same thickness as the metal to be welded, is used. Many operators use aluminum alloy rods, others prefer pure aluminum, claiming that it not only flows better under the flame, but also leaves a more ductile weld than alloy. If the part is to be subjected to strains, an alloy filler had better be used; of about the same composition as the casting if possible.

A good grade of flux may be obtained from a supply house. It should be kept in an air tight can and used sparingly; applying it to the filler or welding rod after it has been heated.

Oxidation takes place very easily—more so than with any of the other metals, and this oxide has a very high melting point. As the metal comes to the melting point this oxide forms a film, which prevents the edges flowing together, and it must be destroyed before a bond can be effected. The method generally used by welders is to destroy this oxide by means of a small iron rod and joining the edges by puddling the metal with the rod.



Types of Flames: A, Acetylene Only; B, Oxygen Turned On; C, Welding Flame; D, Oxidizing or Cutting Flame.

The proper regulation of the welding torch is essential. When the acetylene is turned on and lighted the flame should blow away from the tip from 1/16 to 3/16 of an inch, depending upon the size tip used. The general shape of the flame is that of a round paint brush. As the oxygen is turned on the acetylene flame alters in shape and a blue white rosebud shaped flame appears, attached to the tip. As more oxygen is admitted the acetylene flame becomes shorter and attaches itself to the tip, the centre, blue-white rosebud flame becomes blunt and cone-shaped. This is the neutral or welding flame. The white cone has no ragged edges.

Should an excess amount of oxygen be admitted the blue-white flame becomes shorter, is a darker, dirtier, blue, and is more pointed. Great care should be exercised to prevent this type of flame, as even a slight excess of oxygen is detrimental.

In welding aluminum, a slight excess of acetylene is desirable and tends to prevent oxidation. The work should not be touched with the white cone of the flame. Play the torch upon the line of weld and bring the metal to the molten state, scrape the surface with the iron rod to remove the oxide and add filler. After a little filling material is added, lay aside the filler bar and remove the oxide with the iron rod, which should be kept hot. The flux should be added from time to time by dipping the hot filler rod in it. If a uniform flow of metal is not obtained, add more flux.

After the parts have been welded they should be allowed to cool slowly, well protected against air draughts. After the work has cooled sufficiently, wash all traces of flux from it with water and finish with file or wood rasp.

(When Writing to Advertisers, Please Mention The Automobile Journal.)

LOCATING A SLIPPING CLUTCH.

(F. W., Cohasset, Mass.)

Will you please give me directions for determining whether the clutch on my Ford car is slipping or not? When two lights are connected on one circuit, and one light goes out, is the same amount of current consumed by the remaining lamp as was by the two?

When two lights are on one circuit, as shown in the diagram No. 1, and one burns out, there is not as much current consumed by the remaining one, as was by the two. Assuming that the two bulbs are of the same candle power, voltage and grade (Mazda or carbon), when one burns out or is disconnected the amount of current consumption is cut in half. Each light is made to consume a certain amount of current, which is figured in watts, the resistance of the filament prevents the passage of more current. To give you a better understanding of electrical current let us tell you regarding the measurements, etc.

A volt is the unit of pressure.

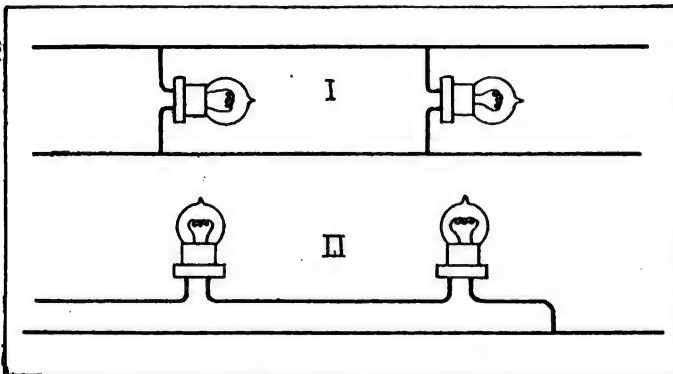
An ohm is the unit of resistance.

An ampere is the unit of quantity.

A watt is the measurement of power.

The flow of electrical current has been likened to the flow of water as follows:

A water tank at a certain height furnishes 15 pounds pressure per square inch (voltage). When an inch pipe is connected to it five gallons of water (amperes) pass through it per minute. If the pipe is long enough the resistance (ohms) of the inside surface of the pipe prevents the passage of so



Bulbs Wired in Parallel (Above); Series (Below).

much water. Each unit, therefore, is dependent to a certain extent upon the other, and so it is with electricity. This law has been stated as follows:

$$C = \frac{E}{R}$$
 which means Amperes = $\frac{\text{Voltage}}{\text{Resistance}}$. This is called Ohm's law.

A watt is the product of the voltage times the amperage.

The lights shown in diagram No. 1 are said to be connected in parallel; those in diagram No. 2 are connected in series. In the latter case, if one light goes out, the other goes out also.

The testing of a Ford car for a slipping clutch is a simple matter; first be sure that the ignition switch is thrown off, then throw in the clutch. Lock the rear wheels so that they cannot turn, either by means of blocks or chains. Then turn on the starting crank. If the crank can be turned while the clutch is in, without the car being moved forward, then it is an indication that the clutch is slipping.

PRESTO ACETYLENE GAS STARTER.

(N. H. L., Newark, N. J.)

Will you please give me the working principle of the Presto self starter? I assume that the pump arrangement on the dash is connected with a Prest-O-Lite gas tank, from which gas is drawn to the pump and then forced into the cylinders, am I right?

Your idea regarding the action of this starter is correct. The operation of the pump on the dash draws a certain amount of gas from the tank and forces it into the engine cylinders.

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34x3 1/2	10.00	3.30	35x4 1/2	14.50	5.55
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inders through a ball check valve. Upon making contact with the switch a spark explodes the charge in the firing cylinder. Theoretically the spark control lever should be set at full retard and then as the switch is thrown in, advanced until the firing point is found.

ADJUSTMENT OF STEERING GEAR.

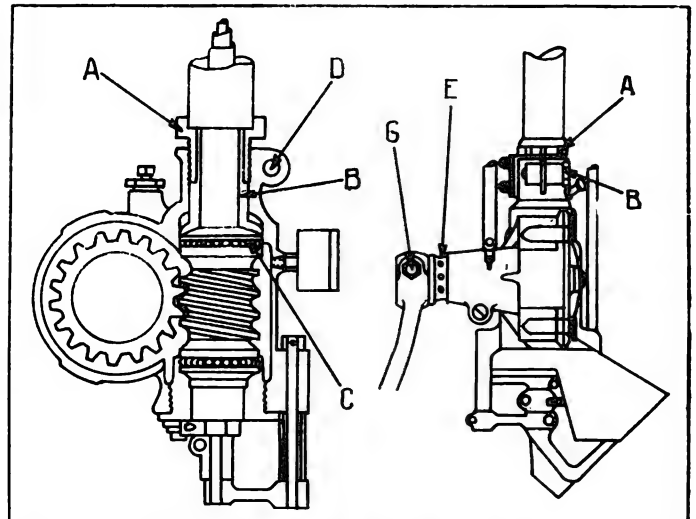
(H. D. W., Ionia, Mich.)

Will you please explain the construction and method of adjusting the steering gear on an Overland model 81, 1915 car?

Herewith is given a cross sectional diagram of the steering gear of an Overland car which clearly shows the construction. There are two adjustments on this type of gear; the first, at A; the second, at E. The adjustment at A is designed to compensate for any wear that may occur at the worm or worm thrust bearings, one of which is marked C. To make this adjustment it is only necessary to loosen the bolt which passes through D, then screw down upon A until the lost motion is taken up.

The adjustment E is designed for taking up lost motion in the worm wheel and should be adjusted only after the front wheels have been cramped into the extreme left or right position, since it is here that the least wear occurs, and to make this adjustment with the wheels pointing ahead would cause the gear to bind in extreme left or right positions. This adjustment is obtained by turning the slotted nut E to the right.

After a time, due to wear, it may be impossible to adjust



Overland Model 81 Steering Gear.

the steering gear, so that there is no lost motion at these two points. Extreme right and left wheel positions take place when the worm wheel has traveled but one-quarter of its circumference, it will be seen, therefore, that by turning the worm wheel to a new position the result is practically a new segment. Take off the ball arm G and turn the wheel until the pinion upon which G is fastened has been turned one-quarter of the way around, then replace G. Proceed with the adjustments as directed in the first part of this letter.

In this type of steering gear most of the wear comes on the worm wheel. There are two rules to adhere to; first, keep it well greased; second, keep the adjustments tight and prevent, if possible, all lost motion.

JACKSHAFT TROUBLE.

(D. J. M., Greenwich, Conn.)

I have a Brasier 30 horsepower chain drive car and am having trouble with the drive. When the car is traveling along on high speed, every now and then it seems as though something "lets go" in the rear, catches and then goes all right for a time. The trouble is intermittent and is not noticeable at times for days, then it will occur two or three times. It sometimes sounds as though gears were being stripped. I have examined the gears in the gearset and they seem to be all right, the master and pinion gears in the jack-

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shaft seem to be in good condition. Can you tell me what the matter may be?

From what you say it would seem that the trouble lies in the differential assembly and may be due to a number of reasons. First, try the following test: Either jack up both wheels or remove the chains from the sprockets, and with an assistant turning the sprocket in one direction on one side, turn the other sprocket in the opposite direction, slowly and carefully. There should be very little lost motion and the drive from one side to the other should be regular and smooth. If you find that there is any point where the turning of one side does not affect the other, it is an indication that one of the gears in the differential is either stripped or partially so, and must be replaced. The same experiment should be tried both with the clutch in and with it out, being careful not to have the spark set so as to cause the engine to start.

If the trouble is not due to broken differential gears, note whether or not the pinion drive gear bearing is seated. If it is not, due to the powerful thrust of the pinion, it will be pushed away from the master gear, giving a similar effect. A similar result is caused by a loose master gear, as of one improperly bolted or riveted to the differential housing.

Now carefully clean out the jackshaft housing (small pieces of metal often get lodged in the housing and work between the gears). See that none of the housing rivets or bolts extend into the case far enough to contact with moving parts.

If the trouble is not in the jackshaft assembly, examine the chain. Be sure that the sprockets are in line. If they are not in line the chain will be forced to "ride" the sprocket at certain points. Chain troubles can easily be found upon inspection.

KEROSENE-GASOLINE-CAMPHOR MIXTURE.

(J. A. O'B., Westfield, Mass.)

Will you please tell me if you think that a mixture of gasoline and kerosene in equal proportions with one ounce of

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gum camphor to every five gallons is feasible for warm weather running? Is there any effect upon the engine or carburetor?

What do you think about fitting a small piece of brass gauze just inside the manifold pipe?

The mixture of gasoline and kerosene in equal parts with one ounce of block gum camphor to every five gallons will be practical and this mixture will not damage either the engine or carburetor. You will probably find that the carbon deposits in the cylinder will increase somewhat, due to the fact that kerosene is used.

Just how well the engine will run when throttled down on this mixture is hard to say and depends upon the carburetor to a great extent. The same applies to starting. You may find that it is best to install a two-way connection on the carburetor, connecting one way with the tank and the other with a small tank of gasoline, using the gasoline to start with and after the engine has heated turning this off and turning on the mixture from the bigger tank.

Your idea regarding the fitting of a piece of gauze in the intake manifold is a good one and such a device is now being manufactured. The manufacturers claim that with this device the mixture is broken up, thus giving better results and preventing backfiring. They also claim that the starting of the engine is made easier. The manufactured product consists of a copper asbestos gasket which clamps between the carburetor and intake manifold and upon which is carried two or three thicknesses of copper gauze.

DIFFERENCE BETWEEN MAGNETO AND DYNAMO.

(H. R., Kansas City, Mo.)

Will you please tell me the difference between a magneto and a dynamo such as is used for charging a storage battery? Can a magneto be used for charging a battery and is it as dependable as a dynamo? What provision is made for controlling the current from a magneto? Is the current from a magneto always alternating?



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It is a well known fact that Paige Dealers are among the biggest money makers in the Motor Car Field.

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Prevent all metal-to-metal contact. The selected flake motor graphite can't ball-up a pack. The minute flakes form over the bearing surfaces a velvety, oily veneer. Send for booklet 210-G.

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(When Writing to Advertisers, Please Mention The Automobile Journal.)

A magneto is a small dynamo, generating alternating current. Magnetos are divided into two classes, low and high tension. The high tension is practically a low tension magneto fitted with a secondary winding or coil which transforms the current to a higher voltage in order that it may be high enough tension to enable the spark gap to be jumped. There is no current controlling device on a magneto and the current is variable as regards both voltage and amperage, depending upon the speed of the armature. A magneto could not be used by itself for charging a storage battery.

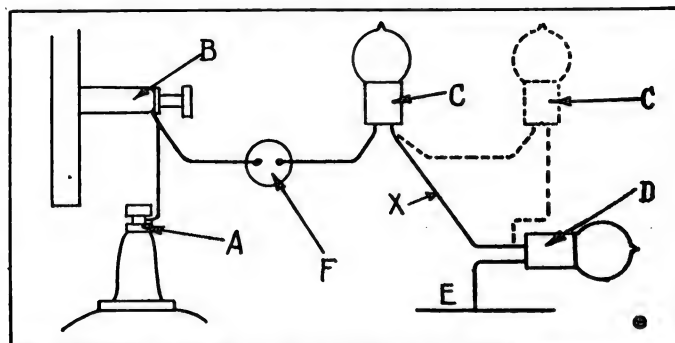
A dynamo generator, such as is usually used for charging storage batteries, is equipped with a voltage regulating device and a cut-out, which is so arranged as to disconnect the line when the generated current falls below a certain point. Such a device is necessary or the battery current would run back through the dynamo as soon as the generated current fell below the battery current. The voltage regulating device is designed to prevent the generation of excess current such as would result from excessive armature speeds. By these two devices the current is held within certain bounds.

In order to use the current from a magneto for charging a storage battery it would be necessary to rectify or change it to direct, then provide some means for controlling voltage.

FORD WIRING DIAGRAM.

(W. A. B., Brooklyn, N. Y.)

Kindly advise me if it is possible to get current from my 1917 Ford car magneto of sufficient quantity to light a tail and dash light. Also what kind of lamps to get and how to connect them.



A, Magneto Plug; B, Dash Terminal; C, Dash Lights; D, Tail Light; E, Frame. If C is Wired Do Not Use Wire X.

The 1917 Ford car magneto generates approximately 18 volts and should be sufficient to light not only head, but tail and dash lamps. Of the two diagrams the first shows a single dash or instrument board light wired in series with tail light. The bulbs should be 9-12 volt and about four candle power. The second diagram shows two dash lights and tail light in series. In this all bulbs should be six volt and candle power to suit, though it is advisable that the candle power be not over six or eight as too much load is put upon the magneto.

CURRENT FROM FORD MAGNETO.

(H. L. S., Salem, Mass.)

Will you please tell me whether the current from a Ford magneto is direct or alternating? If it is alternating, how is it that the vibrating coils may be used with it?

The current from the Ford magneto is alternating and has what is termed a very high frequency, that is, the current direction is changed a comparatively great number of times per minute. There are 16 magnets with like poles together, making eight poles to the circumference. With the flywheel turning at 1000 turns per minute the current will change direction 8000 times; at 1500, 12,000 times. Every mechanical electrical generator generates alternating current and so furnishes it unless it is provided with a commutator. The Ford magneto is not provided with a commutator.

Since the frequency of the current is so high the current is practically continuous and though it is not direct, it can be used with a vibrating coil.



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NOTHING WE COULD SAY—no words of praise we might shower upon our own product—could prove so conclusively the splendid value the Reo line represents as that fact, patent to all buyers—a demand almost hopelessly in excess of the factory output.

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AN ALL-CONDITIONS DEMAND—for changed business conditions seem to have no effect on the steady call for Reos—all Reo models. Fours and Sixes—"Speed Wagons" and Motor Trucks.

TWO MONTHS AGO, just after the United States had declared war and there was a momentary pause while the prudent took stock of conditions past, present and future—a time when some makers felt a perceptible slowing up of orders;—

WE AT LANSING felt instead a very perceptible increase—a greater demand than ever before, for Reos—all Reo models.

THE BIGGEST MONTH in Reo history was May, 1917. And the current month will eclipse that.

ON JUNE FIRST there were on hand orders for immediate shipment as follows: Reo Automobiles, 5,180; Reo Motor Trucks, 1,160.

THAT'S THE TEST; when buyers generally hesitate and finally select with more than ordinary care and discrimination, they select Reos.

THAT'S WHEN QUALITY WINS—and that's when "The Gold Standard of Values" gets the call.

AND RIGHT NOW—well, this is mid-season, of course. We always expect a tremendous demand at this time. But at this writing we lack words to properly express the condition that confronts us—demand almost hopelessly in excess of factory capacity.

IT'S BAFFLING—this over demand that is, at the same time, the pride and the despair of the manufacturer who has set quality considerations above that of mere volume.

IT'S THE REWARD—the rich reward—of that consistent Reo policy—the policy and the principle established at the very inception of Reo and unswervingly adhered to through the years.

"NOT THE MOST—BUT THE BEST"—that was and is and shall continue to be, the Reo watchword.

DOES IT PAY? The Reo order books are the answer.

IT DOES PAY—and pays splendidly in a business that is safe, sure and perpetual. Time but adds to the security—changing conditions but prove its stability.

Reo Motor Car Company

Lansing, Michigan

(187)

THE GOLD STANDARD
OF VALUES

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INDEX TO ADVERTISERS



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These are the claims of thousands of motorists,—some with years of experience, who want full value, and more who know the value of high grade lubricants, and who know when they obtain satisfaction.

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\$7.50

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Times Building, Pawtucket, Rhode Island



Circus tents provided to increase the working space of the big Elgin Factories at 61st Street and Archer Avenue, Chicago

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WHY this unparalleled growth? Why this unprecedented demand for a car that is only two seasons old? BECAUSE the Elgin Six is the most attractive and most salable car in the world at its price.

World's Champion Light Six

The Elgin Six has stood The Acid Test by winning perfect scores and highest economy honors in every one of the many grueling contests it has entered, including the **MASTER DRIVERS' CONTEST**, the hardest and most exacting endurance and dependability test ever devised by automobile experts. Our **\$1000 CHALLENGE** to the automobile world has remained unanswered, proving that the Elgin is the **World's Champion Light Six**.

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Owners of high-priced cars are fast coming to realize that it is impossible to buy, at any price, a car of greater style or beauty, or a car of better performance. And as to economy—"Elgin" is the watchword for Automobile Economy.

Three Elgins in the Reliability Contest of the Chicago Motor Club averaged 25.6 miles per gallon for the entire two days' trip. Elgin light weight also minimizes tire wear.

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In a trip from Chicago to Miami, Florida, over the steep, rocky mountain grades of Kentucky and Tennessee, through the heavy sands of Georgia, and the slimy, treacherous swamp roads of Florida,

From 724 Cars to 7,776 Cars in One Year

No other car has ever won such widespread approval as to demand an increase in sales and production from 724 cars the first year to 7,776 cars the second year. Think what a wonderful growth this is. More than ten times as many cars the second year as the first! No other car has ever approached such a record!!

From 8,064 Sq. Ft. to 108,800 Sq. Ft. Factory Space in One Year

The ever-increasing demand for the Elgin Six has required expansion in our factory space from 8,064 square feet to 108,800 square feet in one year. And even with this record-breaking increase we have been compelled to supplement our regular factory space by two large circus tents. Another big factory building is now in course of construction. When completed it will enable us to double our output.

Ask for folder, "Elgin Winnings," which proves why the Elgin Six is the World's Champion Light Six and the most salable car in the world at its price

Elgin Six

"Car of the Hour"

Address: Dept. 12 Elgin Motor Car Corporation, 2427 Michigan Avenue, Chicago

DEALERS:

The addition of another big factory building, now in course of construction, is preparing us to double our output. This enables us to take on a few more desirable dealers. If your territory is not already covered, wire us to reserve your territory and send you full particulars about our liberal offer to dealers.

the Elgin Six established a new record by traveling 1,626 car-racking, stamina-testing miles in 67¼ hours.

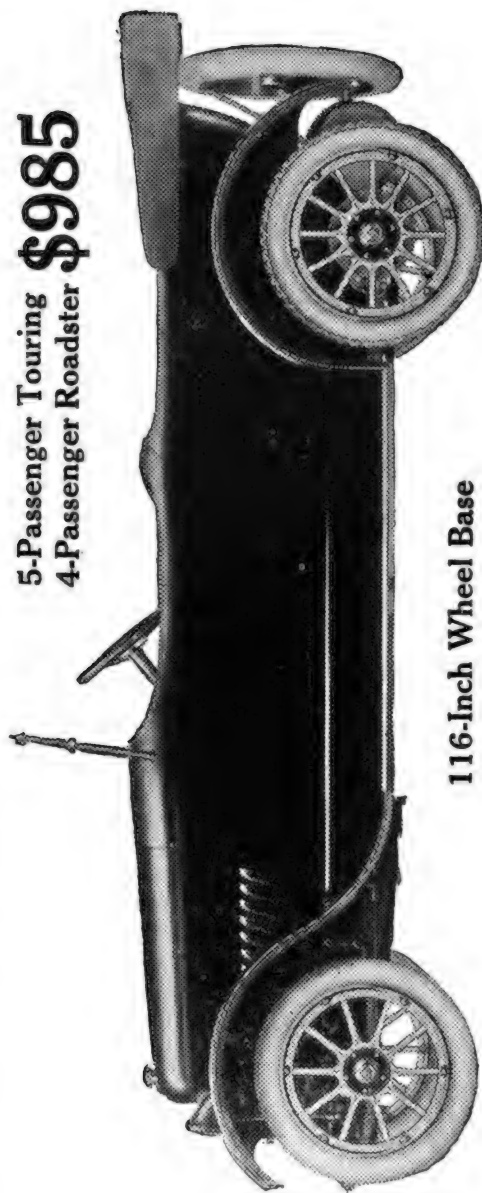
"Millionaire's Value at a Popular Price"

Whether loafing along at low speed, with its motor purring like a contented kitten, or thundering over the roads at mile-a-minute speed, the Elgin Six personifies automobile smoothness and power. Combined with its beauty and luxurious comfort, these features make the Elgin Six "The Millionaire's Value at a Popular Price."

The Big Reason

But to fully appreciate the big reason for the wonderful Elgin Success you must see the car! Ride in it! Try to find a fault or weakness. Then you will realize why Chicago's young industrial giant has grown by such leaps and bounds in the effort to keep up with the demand for the Elgin Six. Then you will also appreciate why people say: "How can they do it at the price?"

5-Passenger Touring **\$985**
4-Passenger Roadster



116-Inch Wheel Base

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AUTOMOBILE JOURNAL

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Entered as second class matter, April 15, 1906, at the Postoffice at Pawtucket, R. I., under act of Congress of March 3, 1879.

Ten Cents
a Copy

WITH this issue the Automobile Journal begins the presentation of facts showing that the used car problem is one that can be disposed of by manufacturers, dealers and owners, and that it is by no means necessary in working out this proposition to submit to arbitrary set price systems which do not take into account the real values in a car. That the whole automobile situation from factory to owner would be marvelously cleared by firm dealing with this question cannot be gainsaid. Many pitfalls for the trade into which an unopposed continuance of an ill-founded set price method would lead are set forth in a survey of the used car markets of the eastern cities in the opening pages of the magazine.

THERE are many practical directions valuable to a motorist who sets out to buy a used car. The article "Analyzing the Purchasable Values of a Used Car," sets forth the practical points that will enable a proper and reliable estimate of car worth to be made, and these it is the aim to make so plain that extensive expert knowledge is not required in order to arrive at a fair, accurate judgment.

FROM the current number, on which it is all too easy to dwell, it is well to pass onward to what the future has in store for the readers of this magazine. In the next number, July 25, and succeeding issues earnest attention will be paid to other phases of this all important issue. The facts regarding service values in many cars of standardized parts are full of interest to every motorist and to every prospective car owner. Those which are to be forthcoming in the July 25 issue will go a long way to make clear why a campaign of education is the logical solution of the used car problem.

LXIII.

JULY 10, 1917.

NO. 11.

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Treasurer . . WILLIAM H. BLACK
Secretary D. O. BLACK, JR.

Published the 10th and 25th of each month by the

AUTOMOBILE JOURNAL PUB. CO.
Times Building, Pawtucket, R. I.

MIDSUMMER, here with all its joys of vacations and motor tours, brings the average motorist to a realization of the comforts to be found in apparel that not only fits the occasion, but which is in many ways distinctly connected with motor-dom. Followers of fashions and particularly motoring fashions, will do well to follow up the articles of Mrs. Hitchcock, appearing regularly in these pages. All who go a-motoring will find much that is interesting and instructive in the fashion pages, and next time there will be more about midsummer frocks for the motoring women, as well as something interesting for the "littlest girl who goes a-motoring," too.

THE announcement in the last issue of those who received rewards on supplying the best answers to questions propounded in the Queries department is stimulating interest in the idea exchange. Already several have written to the editor on later topics announced. It is a particularly happy custom in motorland to help the other fellow when he is in trouble when the subject of distress is found along the wayside. It is fine, too, to extend this custom to the fireside and the study, giving fellow motorists the benefit of one's experience so that they may be provided with information against that time when occasion arises to use it.

RECENT record breaking increases in automobile registrations tell not only of the popularity and usefulness of the highway motor vehicle, but testify to the confidence of the people in the vast energy and resources of America. The necessity for diversion and recreation, in spite of the war, is serving as a powerful force in sustaining the people to a normal life. The motor car is the vehicle that helps maintain it.

"BUSINESS AS USUAL"

*We Are Fighting a Big War and It Must Be Financed From
the Profits of Business, So Keep the Profits Coming.*

**Use the Mammoth Outlet for Accessories and
Equipment Found Among the Thousands
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**REACH THIS GREAT ARMY OF PARTS AND
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The Automobile Journal

—AND—

Accessory & Garage Journal

**BIG SPECIAL COMBINATION USED CAR NUMBERS
WILL BE MAILED AUGUST 25, REACHING
57,500 DEALERS AND OWNERS**

Drive Your Business or It May Drive You!

Thousands of Used Cars are on the markets, being traded, sold and exchanged. Dealers throughout the country are making special preparations to handle Used Cars. These cars must be repaired, fitted out and parts replaced. Machines will pass to the hands of new owners who will have to equip them with new and necessary accessories. These magazines are conducting a mighty campaign to help the dealers in disposing of Used Cars and educating the public into buying them. It will bring you in direct touch with this great market and in these two special issues the Used Car subject will be treated from many angles. Discussions that will interest manufacturers, dealers and owners alike and which will make clear the many forms of utility of the Used Car.

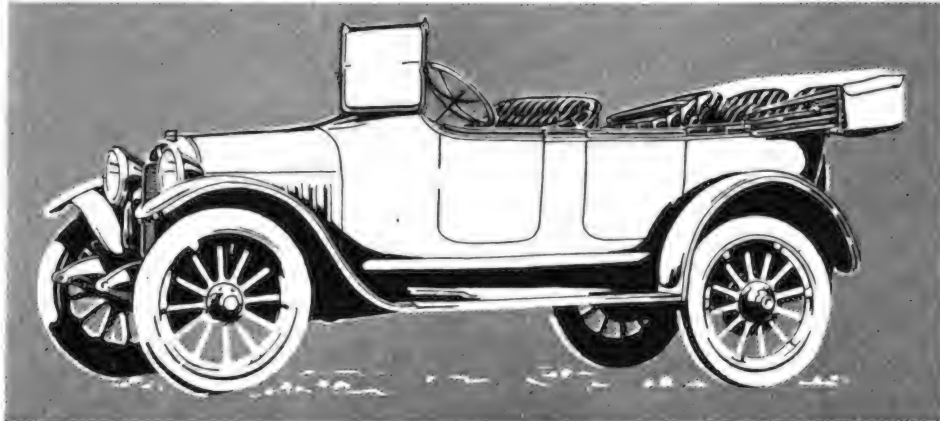
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You actually save money if you buy this car now

Extra value as expressed in the Inter-State is due to three good reasons:

First. The Inter-State has been, and is being built on a principle which demands the perfection of one design and strict adherence to that design. This means savings in excessive overhead expense—absorbing high tool charges over a period of years—a steady growth in individual workmanship through familiarity with each operation of manufacturing.

Second. Success can be obtained in building one design for years only by the determination to have the design right in every respect from the outset—and the ability and resources to use materials of such high quality that the performance of such a car will

give satisfaction, and a high re-sale value after one, two or even five years' service.

Third. And the greatest reason for Inter-State extra value now—This established car—backed by years of satisfactory service—is offered you today—at no increase in price since the first of the year—because the materials used in the Inter-State were purchased before "war" prices went into effect.

Six Body Sizes

\$850

TO

\$950

We have a limited number of these "lower-cost" cars for distribution. Later, we will be forced to use materials at greatly increased prices.

We will never cheapen the quality to lessen the price.

So remember—as long as these cars last—you, the buyer, save money—gain extra value—which we offer to prove to you cannot be equaled at the price. Today, before you buy any other car, investigate the Inter-State.

WRITE FOR ILLUSTRATED CATALOGUE AND NAME OF NEAREST DEALER

INTER-STATE MOTOR COMPANY FACTORY AND GENERAL OFFICES: MUNCIE, INDIANA

INTER-STATE BOSTON COMPANY

NEW ENGLAND DISTRIBUTORS

167 Massachusetts Avenue - - - - - - BOSTON

THE Automobile Journal

LXIII.

JULY 10, 1917.

NO. 11.

USED CAR PROBLEM SOLVABLE BY MANUFACTURER, DEALER and OWNERS

Values Should Be Maintained On All Cars in Accordance With Their Condition and the Amount of Service They Are Capable of Rendering—Forced Depreciation in Prices Can Be Combated and the Demand for Vehicles Stimulated

SO FAR as the manufacturer and dealer are concerned the used car question has aligned itself as an unavoidable problem that must inevitably be dealt with. Although distasteful, it will perpetuate itself; and the ostrich like attitude assumed by some of refusing to recognize its existence will not help the situation in the least.

No stronger evidence is found of how large this problem looms up on the business horizon than in the fact that in all the big cities there are thousands of used cars on the market constantly. In Boston alone there are in the neighborhood of 2000 cars advertised for sale every Sunday in the newspapers, or about 10 for every automobile dealer in the city. A similar situation obtains in New York City, and in the smaller New England cities it is of proportionate magnitude. Why should not dealers sell all of these cars?

Some persons, associations and publications have started a movement to establish set prices on used cars as a solution of the problem. The actual origin of this movement is not clear, but it is self-evident that it had its birth with some persons inexperienced in business, and who, in an eager effort to solve the question, jumped at easiest conclusion, having no regard for owner or dealer and announced the result prematurely. Being a simple solution the set price idea immediately found supporters among other inexperienced persons who

are not inclined to consider anything more than superficially, and as a result the movement gained considerable momentum. Not so much, however, that it cannot be checked before it will have

of course, be in accordance with the relative position he occupies in the trade. If he is one of the big manufacturers, with an established market and years of prestige back of his product, he, of course,

occupies an advantageous position. Hence a schedule of prices if carried out by an organized body of manufacturers or distributors will more firmly entrench him in the trade and will have an intensified adverse effect upon the other maker who is handling the problem of extending his field of distribution.

In the event of prices on used cars by schedule prevailing, the industry would be affected to an enormous extent, owing to the fact that only a small proportion of the manufacturers enjoy an established market throughout the country, while a good percentage of makers are still in the beginners' stage so far as distribution is concerned throughout the nation.

The actual situation is best indicated by the statistical position of the industry as revealed in a compilation of statistics published at the time of the agitation of the proposed federal tax of five per cent. on all sales of new cars. In the testimony introduced on the war revenue bill at that time it was stated that

there were 450 listed automobile manufacturers in the United States, of which number 12 produced 80 per cent. of the output, and 438 makes 20 per cent. Without mention-



For Practical Points on the Selection of a Used Car, See Page 17, This Issue.

wrought unlimited injury in many directions to dealers, and particularly to a certain class of manufacturers.

Effects on the Manufacturer.

The effect upon the manufacturer will,

ing any names, these 12 makers must include practically all well established makers, and they would enjoy all benefits, if any, to be derived from general adoption of a price schedule on used cars, to the detriment of the best interests of the other 80 per cent. in the business.

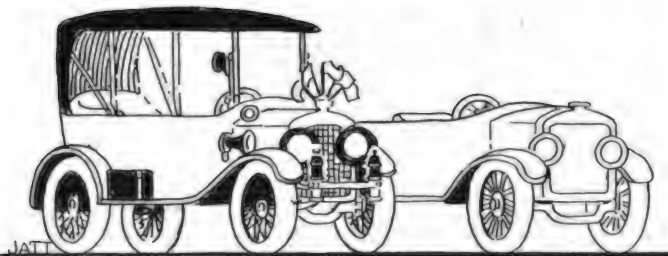
For example, let the case be supposed of a representative of one of the makers in the 80 per cent. category, who goes out to seek a new dealer. He finds one and is on the point of closing with him when the latter discovers that the second hand value of the car that is offered to him to distribute is less than 50 per cent. at the end of the first year. Unless the sales manager is exceptionally clever he cannot fasten the agency on that dealer, as the latter knows that he must be placed at a disadvantage the moment he takes on a car which shows a greater depreciation after a year's use than is shown by a competitive car in the same price class. If, however, the dealer is new in the business, he might take on the car, whereupon his agency proves not a good one for the manufacturer, as he finds it difficult to sell the experienced car user a machine that depreciates in value over 50 per cent. at the end of the first year. He loses many customers and his field is necessarily limited, as it is now an established fact that about 80 per cent. of new car purchases are made by persons who are already owners. In other words, the agent representing the makers of 80 per cent. of cars produced has actually an open field of only 20 per cent. of the car purchasers in the event of a schedule of set prices being established, as proposed, thereby establishing a scale of depreciation that favors the car that is in demand and that has been on the market for years.

Just why such discrimination should exist is difficult to understand in view of the conditions obtaining generally in the manufacturing end of the business and the high degree of standardization that exists in the making of cars.

Many Cars with Identical Parts.

Furthermore, there are a dozen or more large manufacturing concerns who specialize in parts, whose output is found in a large percentage of the different makes of cars. In many instances two cars selling at the same price will be found to have the same make of engines, wheels, transmissions, frames, electrical equipment, batteries, tires, steering gear and bodies—yet at the end of a year their second hand values will vary from 20 to 30 per cent., with the favor on the side of the car that has an established market.

When these conditions are explained to the prospective buyer by the agent selling the car that is less well known, the latter has difficulty in understanding why such a situa-



Some Owners Dress Their Cars Up With All the Fixin's, While Others Turn Them In Stripped of Every Accessory.

tion exists and may thus be influenced in favor of the car made by the manufacturer in the 12 per cent. section.

On the other hand, take the purchaser of the car that has a low resale price at the end of the year. He goes to his dealer to dicker for a new car and offers his old one in exchange. It cost \$1000 originally and the dealer says he could allow him but \$450 for it in exchange. If the owner is any kind of a business man the offer immediately strikes him as preposterous. That his car, which will continue to give good service under average conditions for five years to come, having, therefore, actually depreciated only 16.66 per cent. in service value, has dropped 55 per cent. in market value, is beyond his comprehension. The new deal, in nine cases out of 10, is called off on this account and the owner is apt to be found using his car through several more years before he again returns as a prospect for a new one. As a result, although the market is relieved of one more second hand car, there is one less new car disposed of, and it is certain that repeated blockades of this kind are not conducive to healthy, progressive, active business.

It is difficult for the dealer to arrange an amicable agreement under such conditions, as he is not in the position of the dealer who handles the car on which a 35 to 40 per cent. depreciation has been fixed for the first year; and he also finds in many cases that the other dealer will offer his customer more for his second hand car in trade for the competitive make than he could afford.

Price Facts in Open Market.

Along the same line of reasoning and logic with the adage that "nothing succeeds like success," in demonstrating the status of the used car price problem, the analogy that "the proof of the pudding is in the eating," brings it down to the

question of simple facts. And what are these facts except the fact of price established in the open market?

Sophistry and argument carried beyond this point with intent to create a false impression of a situation otherwise true would be worse than foolish and futile. Consequently car owners and dealers are to be reckoned with from now on.

In the vernacular of Wall street, or in the great grain pits at Chicago, there are several expressions which are used to designate the conditions of the trade. When traders read in the tape, "buyers and sellers apart," they know the market is dull because the two necessary factors to consummate a trade, namely, the buyer and seller, cannot agree on price; consequently, trading will be dull until the buyer is influenced to increase his bid through some influential development, or until the seller, affected by an adverse development bearing upon the value of his article is willing to lower his price.

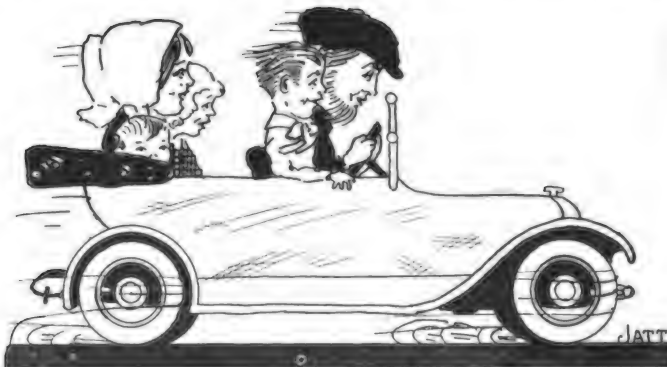
When the trader again sees on the tape "market strong," he knows that there is a preponderance of bidders, with a resultant advance in prices. When the market is termed "weak" he knows that the reverse is the case, and that there is a surfeit of offerings, causing prices to decline. This is the law of supply and demand functioning, as it also does in the automobile trade.

No Central Used Car Exchange.

The second hand market has no great central exchange such as they have for metals, wools, cottons and other products of the soil, but a fair criterion of values is found in the press where thousands of advertisements appear daily. There are few bids for cars, it is true, appearing in the press, but the offering prices are quite close to the actual market, as the dealers are in close competition and cannot afford to keep their money tied up any longer than necessary. Hence it results that they place their selling prices at, or as near as possible, the actual market figure dictated by the demand.

What does the investigator find in this great market established through these sales? Not that all automobiles of the same make and model are selling at the same price, but a wide discrepancy in price, due to the fact that both individual owners and dealers recognize that second hand values in cars, resting largely upon the condition of the cars, fix their offering prices accordingly. There must be a reason for owners to advertise and sell their cars.

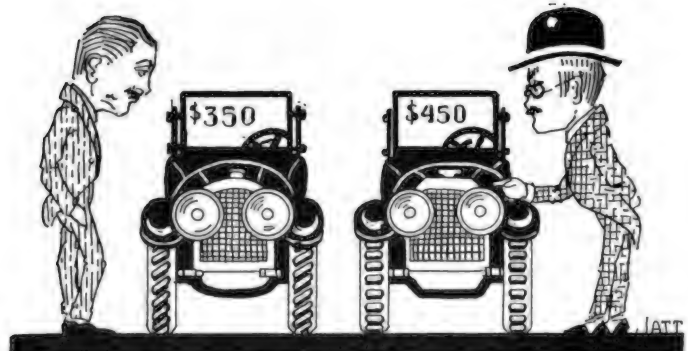
There appears much wisdom in so doing, as a merchant could not expect a customer to come and pay the same price for a car that had been driven 25,000 miles as he would for one that had been driven only



A Used Car Retains All Its Elements of Service and Satisfaction to Many a Man and His Family.



Getting Market Values on His Make of Car Before Going to the Dealer to Trade It In.



With Component Parts Almost Identical a Prospect Is Mystified at the Wide Variation in Price.

5000 miles, all other things being equal and the former having a better top or better looking exterior.

Abandoning Yearly Models.

No greater proof that this method of appraising a car is the fairer and more practical can be obtained than is found in the action of many of the foremost automobile manufacturers in the country of discontinuing the practise of announcing yearly models. They were influenced into this action by the fact that throughout the used car market the yearly model idea was seized upon by the traders and others as a means of depreciating the values of used cars. It did not seem logical to them that a car sold at \$2000 in January, with a normal life of 100,000 miles, should have a market value of \$1000 set upon it at the end of 5000 miles, just because it had been in the owner's hands a year. If the owner was to keep it and run it throughout its theoretical life, it would have 95 per cent. of its value remaining instead of the 50 per cent. value imputed to it by those who would arbitrarily fix the price.

A study of the classified advertisements in the big dailies in the eastern cities immediately convinces one of the futility of the fixed price idea. Dozens of instances can be found wherein two cars of the same make, model, year and apparently the same condition, are advertised at prices varying from 50 to over 100 per cent. These offerings are not alone from owners, but also from dealers, and dealers who make a specialty of second hand cars.

Cases are also found where dealers will make a blanket offer of a dozen or more cars of different makes at so much each. In many of the advertisements

considerable space is devoted to description of the cars to bring out the fact that they are in good running condition, while in others a flat price and name alone is stated and the offer is made on the "as is" basis of common practise.

Bargains in the Newspapers.

The prices established in these advertisements, when compared with those in the catalogues of the makers, show such a variation that it would be almost impossible to establish any accurate criterion from the showing. In one case we find a car that sold for \$1650 being offered at \$1150 and another of the same make, model and answering the same general description, at \$865. Another car in the same price class practically, originally selling for \$1295, is offered at \$700. The differences in the extreme depreciation found here is that between approximately 50 per cent. in the first instance and 45 per cent. in the second.

In the cheaper cars the variance is found proportionately as great in numerous instances, indicating that in many cases the owners are willing to sacrifice for quick cash. Other cases are found where prices are not only lower than the average, but the seller is willing to take his settlement on a basis of easy terms. Dealers have also adopted this plan of increasing sales, as it appeals to many wouldbe prospects who could not secure a car under any other circumstances.

It is also noticed from week to week in cases where dealers and organizations attempt to maintain a fixed price on their offers, that the same cars are continually offered, with only a few absent, that would indicate the sale of any.

Supply Governs Resale Prices.

A price is fixed on a new car because

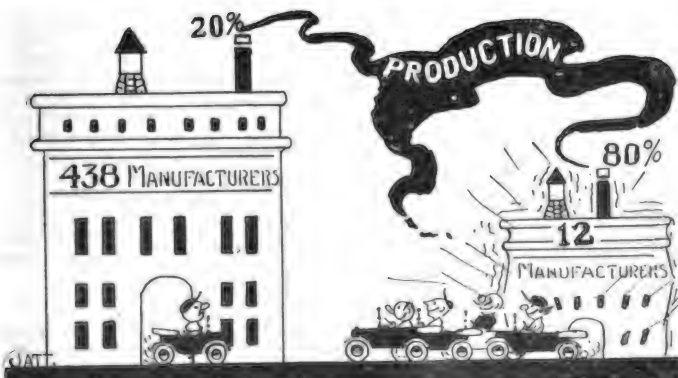
the manufacturer of it controls the supply and can, therefore, arbitrarily dictate what it shall be sold for. When this car, or these cars, come into the buyers' hands, however, their resale price must necessarily be governed by the supply and demand, and the demand, in return, will be regulated according to the price asked in relation to the condition of the car. Thus we find that the price will be largely governed by the condition or state of repair of the car and will be favorably or adversely affected in accordance as the condition of the car varies from its original state when turned over to the original purchaser.

There are several thousand parts to every car, all subject to wear or deterioration to some extent or other, and the depreciation in valuation resulting from this process of wear, or aging, will, of course, be determined by the general condition of the machine as represented by the condition of the parts, other things being equal.

As in business, it is true that a trade mark or name, if it has already popularly been received as standing for quality or superiority, will have considerable effect upon the person in estimating the valuation of a car. The name, however, would have nothing to do with appraising the value of two cars of the same model, the question of value again resting upon condition alone.

Varying Condition of Same Model.

Taking two models of the same make and ones that were delivered on the same date, it would only be through a series of unusual coincidences that they would both have the same value at the end of a year. One would undoubtedly be driven farther than the other, or else



Twelve Manufacturers Make 80 Per Cent. of the Cars and the Other Odd 438 Makers Turn Out Only 20 Per Cent.



Mr. Newdealer Seems Helpless Against Advantage Held by Competitor, Whose Car Has Larger Second Hand Value.

would have received less care and attention than the other; differences which would be bound to affect the actual value of the cars if given a careful appraisal.

Granting that the mileage covered had been the same and that an equal amount of attention had been given both, the owners would probably have possessed different tastes in equipping their cars, with the result that in accessories alone there would be a difference of several hundred dollars in the offhand valuation of the two machines.

Let all things again be equal and have the two owners meet. When a trade is proposed both would possibly feel as though they were entitled to something to boot, wherein we find the sentimental valuation of a car largely through association.

Getting at Actual Valuation.

The actual valuation, however, in a deal where the buyer was going to take time to determine the running qualities of the car, the condition alone would enter into its value. Wear on springs, bearings and other moving parts would be the

first consideration as being the most costly to replace, while appearance would also count, as it would again figure largely in the resale price should the buyer pass it along to a third party.

Of course a deal involving a second hand article must necessarily take on much of the guise of a horse trade, both parties framing their argument to get the most out of it; the seller the best price and the buyer the most for his money. The seller, therefore, proceeds to show up the different parts of his car to prove that they are intact, but slightly worn, and in good working order. He also calls attention to other features, the good condition of the paint, top and tires—and thus establishes his claim to the value asked.

A mere arbitrary declaration that the car was such and such a make, was produced in a certain year and therefore had a fixed value, would be ridiculous in the eyes of any business man.

The Automobile Journal contends that the real remedy lies in the hands of dealers and manufacturers and consists of educating the

public to the fact that there is actual worth and service in the majority of used cars, in this way establishing a demand market for them.

How to Create a Demand Market.

Every dealer should make an earnest effort to handle his used cars in a practical manner and develop a market in his home territory.

The manufacturer should promote and conduct a campaign to demonstrate the actual service life of his products as a means of protecting owners, dealers and prospective buyers, when new cars are marketed, resold or traded.

There are thousands of owners today driving cars that were purchased second hand, and they are giving good service and satisfaction. If these facts were more generally known there would be thousands of additional customers for used cars and it would open up an avenue of distribution to relieve the present congestion in the used car market.

In the July 25 issue of the Automobile Journal facts will be given making clear why this is the logical solution of the used car problem.

Used Cars Offered For Sale In Eastern Cities

Examples Taken From Boston Papers

1916 ALLEN RUNABOUT, \$350.

ALMOST BRAND NEW, only run 1100 miles by present owner, who has gone to France; every possible extra, light and inexpensive to operate, easy riding.

1917 APPERSON ROADSTER, \$1000.

RUN ONLY 1200 miles and is offered for sale only because owner must go away; full factory guarantee and thorough demonstration allowed; call at once for bargain.

1916 BUICK, \$725.

LIGHT SIX 5-passenger touring car, delivered Feb. 24; fully equipped, self starter, electric lights, 34x4 wheels, one spare tire and rim; has been used 3000 miles; absolutely as good as new.

1916 BUICK TOURING, \$700.

"LIGHT SIX" model, almost new, paint, tires, etc., perfect, and motor very quiet running and powerful; inexpensive to operate and very easy riding; guaranteed.

1916 BUICK SIX.

SEVEN-PASSENGER, with winter top, \$690.

1916 BUICK.

SEVEN-PASSENGER touring car, electric lights and self-starter, paint and general mechanical condition excellent; equipped with bumper; a genuine bargain at \$850.

1916 BUICK D-55 \$750.

SEVEN-PASSENGER, newly painted and new tires, 2 spares, car fully equipped ready for the season; will thoroughly guarantee and demonstrate in every respect.

FOR SALE—1915 Buick C 25 touring car in first class condition; has been overhauled this spring and a new battery installed; four new Goodyear tires; can be seen at any time; price, \$525.

\$425—1915 BUICK, MODEL 25.

TOURING CAR in perfect condition and is fully equipped; this is a very economical car to run; will go 20 miles on a gallon of gasoline.

1915 BUICK ROADSTER, \$450.

MODEL C 36; finest possible condition; powerful, easy riding and quiet running; all excellent shoes and original paint in fine condition; call for bargain.

\$465—1915 BUICK, MODEL 36.

ROADSTER; in perfect condition and is fully equipped.

1916 CADILLAC 8 TOURING, \$1550.

ONE LEFT; overhauled, repainted gray and guaranteed.

1916 CADILLAC, \$1250.

SEVEN-PASSENGER; newly painted and in first class mechanical condition; practically new tires, shock absorbers and lots of extras; call for ride with your own mechanic and we will demonstrate thoroughly.

1915 CADILLAC 8 TOURING, \$1150.

THREE LEFT; overhauled, repainted and guaranteed.

1915 CADILLAC 8-CYLINDER TOURING. REPAINTED; this fine 7-passenger car is perfect in every way; let us demonstrate; price only \$850.

1917 CHANDLER TOURING CAR, \$950.

DRIVEN very carefully but 6000 miles by a lady; all new tires and in fine condition; traded for a Willys-Knight.

\$800—1917 CHANDLER TOURING CAR. IN PERFECT condition; been overhauled and newly varnished and looks and runs like new.

1915 CHANDLER touring; overhauled and repainted; \$550.

1915 CHANDLER TOURING, \$500.

BEEN thoroughly overhauled and repainted and can hardly be told from a brand new car; inexpensive to operate and easy riding.

1916 CHALMERS, Master Six, touring car; painted gray; just out of shop; electric lights and starter; a very handsome, easy riding car and in excellent condition throughout; \$750.

1916 CHALMERS 6-40; seven-passenger; repainted; \$575.

\$500—1915 CHALMERS.

SIX-CYLINDER, five-passenger touring; paint and tires in perfect condition; has been driven only 4000 miles.

\$350—1915 CHALMERS SIX TOURING. FIVE-PASSENGER; in A1 condition and is fully equipped.

CHEVROLET touring car, 1917; driven 300 miles; price, \$475; cash or time.

CHEVROLET, 1916; Baby Grand touring; perfect condition; good tires; \$425.

1916 CHEVROLET TOURING, \$375. "BABY GRAND;" electric starter and lights; excellent mechanical condition; many extras.

1915 CHEVROLET, \$350.

ROADSTER, with electric lights and starter; extra shoe; always been driven by original owner, who has just traded for touring car; has been newly varnished and looks like new.

CHEVROLET ROADSTER, royal mall, good condition, new paint, 1915 model; price, \$250; cash or time.

1917 COLE 8 DEMONSTRATOR.

SEVEN-PASSENGER touring; \$1500; run 5000 miles; perfect throughout; new car guarantee.

COLE 8, Model 860; seven-passenger touring car; \$1250; overhauled and repainted; new tires and complete tool equipment; only two left; an exceptional opportunity; new car guarantee.

1917 COLE "8" CHUMMY, \$1450.

ROADSTER; driven but 2200 miles; not a mar or scratch on paint; in fact it would be hard to tell the difference between this and a new car.

COLE 8 ROADSTER.

SEATS 4; wire wheels, two extra, all tires good; run only 2700 miles; must be sold; bargain; \$1150.

DODGE touring car, 1916, for sale; run 5000 miles; excellent condition; price, \$550 cash.

FOR SALE—1916 Dodge touring; private family going away; for quick sale \$525.

\$450—1915 DODGE.

TOURING; paint and tires in good condition; completely equipped.

DODGE BROTHERS TOURING, \$425.

1915 PRODUCTION; as serviceable as new if given ordinary care; full value here; a most economical car to operate.

FORD 1917 touring car; absolutely perfect and better than new; run 250 miles; demountable rims, oversized tires, aluminum running board, tire holder, bumper, extra tire, 12 tubes, never been on; cost \$460; price, \$425.

FORD CARS—1917 touring, \$325; 1916 touring, demountable rims, \$300; 1915 touring, \$225; 1914 touring, 1912 touring; low price for cash.

FOR SALE—1916 Ford touring car, \$375; in good running condition; tires nearly new.

1916 FORD, \$250.

TOURING car with electric lights, seat covers, has been used 2000 miles; absolutely as good as new car; fully equipped; must be seen to be appreciated.

1915 FORD TOURING, \$250 TO \$300.

SEVEN to choose from; some with electric lights, extra shoes, slip covers; some with new 1916 bodies.

1915 FORD TOURING CAR.

FOR CASH, \$225; good condition; shock absorbers, K. & W. Yale lock; just overhauled; no dealers.

1916 HUDSON SUPER-SIX, \$1150.

SEVEN-PASSENGER touring car, has original paint and tires, extra rim and tire; only been driven 3000 miles; looks and runs as good as new; will sell it on terms to responsible party.

1916 HUDSON, \$865.

SUPER SIX seven-passenger touring car; used 6000 miles; full equipment 4 new tires on car, one spare tire and rim; this car has original paint and is in excellent condition; will demonstrate thoroughly and fully guarantee.

1915 HUDSON TOURING, \$575.

MODEL 6-40, in finest possible condition throughout; this fine, light, 7-passenger touring car is suitable for family or renting purposes; call for real bargain.

\$485—1915 HUDSON 6-40 TOURING.

SEVEN-PASSENGER; in good condition and is fully equipped; excellent renting car.

\$300—1914 JACKSON ROADSTER.

IN THE finest possible condition; has self-starter and electric lights, speedometer, clock, extra new tire and rim; tires and paint like new.

1914 Jackson Roadster, \$230.

1917 KISSEL SIX-THIRTY-SIX, \$700.

THIS "Hundred Point Six" has just been overhauled and is in wonderful condition; equipment includes \$55 set of seat covers and two extra tires, one a brand new Firestone non-skid.

1916 MAXWELL, \$375.

FIVE-PASSENGER touring car with self-starter, electric lights; in the finest possible condition; tires and paint new; demountable rims, one extra, shock absorbers; call for demonstration.

FIVE-PASSENGER Maxwell, \$325; 1916; self-starter, lights, clock, speedometer.

1916 OVERLAND, \$425.

FIVE-PASSENGER touring car, model 88B, block motor, has been thoroughly renewed; self-starter, electric lights; must be seen to be appreciated; spare tire and rim.

FOR SALE—1916 5-passenger Overland; electric lights, self-starter, 4 new non-skid tires; paint and everything first class; call any time Sunday and ride; will sell, \$375.

1915 OVERLAND; 4-cylinder; model 80; 5-passenger; \$500.

1915 OVERLAND; model 80; 5-passenger touring; overhauled; original paint; \$400.

1915 PAIGE roadster; 4-cylinder; in fine shape; \$500.

1915 PAIGE ROADSTER, \$400.

POSITIVELY cannot be told from a new car; has been thoroughly overhauled and repainted and is equipped with seat covers and many other extras; don't miss this fine trade.

SCRIPPS-BOOTH 1916 roadster for sale; mileage 2500; perfect condition; \$500; or will trade for Buick or Hup four 1916 or 1917 roadster and pay cash if condition good and mileage low.

\$425—SCRIPPS-BOOTH ROADSTER.

IN PERFECT condition and fully equipped; extra wire wheel and tire and many extras.

1916 STEARNS-KNIGHT light 4-cylinder, 5-passenger; overhauled and repainted; only run 5000 miles; an ideal light, economical car; 15 to 20 miles on a gallon of gasoline; 34x4 tires; very powerful and a wonderful hill climber; an unusual bargain; \$900.

1916 STEARNS-KNIGHT Small "4" touring, \$800; 5-passenger; very low mileage; finest condition.

1916 STEARNS-KNIGHT 8-cylinder, 7-passenger touring car; we have several of these models that have been taken in trade for new 1917 cars; these cars have been thoroughly renewed and repainted by our own mechanics and with all the 1917 improvements which have been attached they are practically as good as new; there is nothing on the road that can equal them at this price, \$1400.

1916 STEARNS-KNIGHT, 8-cylinder, 7-passenger touring car; recently overhauled and repainted; this car has a smart streamline body and the tires are excellent; we would like to give you a demonstration and let the remarkable riding qualities speak for themselves; \$950.

LATEST 17 series Studebaker four touring; finest private care; positively immediate sale; best offer above \$550; worth \$750.

FINE Studebaker 17, like new, \$700 or best offer Sunday.

Number of Instances Taken From New York Papers

BUICKS, 1915-16, 4 and 6 cylinder, 5-7 passenger touring; Scripps-Booth 1916, Hupmobile 1915 touring, \$450; Chevrolets 1916-17, all models, \$275 up; Studebaker, 1917, \$600; Chevrolet Amesbury roadster; Cadillac 1911 taxi, \$150; Loco 1912 "6-36" landaulet, Loco 1911 "30" touring, \$250 each; Packard phaeton, 1914; Marmon "6," 1914; Cole "8" 7 passenger; Franklin 1913 touring, \$250; Saxon runabout "6," 1916, \$475; Chalmers coupe, \$165; Pierce 1912 6-26 touring, \$450; Cadillac 1912 touring, \$250; Overlands, 1914, 1915, 1916; Regal 1914 touring, 7 passenger, \$250.

SCRIPPS-BOOTH 1916 roadster, painted gray; slip covers, spot light, mirror, extra folding seat on side; in very good condition mechanically; \$425.

OAKLAND "sensible six," absolutely new; price now \$1000; will sell for \$850; demonstration given.

STEARNS-KNIGHT 8-cylinder; driven 4000 miles only; \$1350; no brokers.

PIERCE "66" LANDAULET, late model; Brewster body, starting and lighting; cost \$7000; sacrifice price.

DODGE TOURING, \$500.

1916 Delco ignition; complete; extras; ready instant service.

FOR SALE—Buick 1917, light six touring; fully equipped, including bumper, shock absorbers, mechanical tire pump, lock, clock, mirror, two cord tires; new, perfect condition; price, \$900.

CHEVROLET 1916, 5-passenger touring; runs and looks like new; sacrifice for \$450; any demonstration.

CROW ELKHART 1916 Cloverleaf, seating three; newly painted blue; perfect condition; run 2100 miles; demonstration; \$475.

PAIGE 1917 7-passenger touring; in every way as new; any demonstration; price \$850; a rare bargain.

MAXWELL; blue; dandy; late 1916; run 2250 miles; pleasure; lawyer; want larger car; will take \$450; no dealers.

SAXON SIX, \$475.

1916 light 5-passenger; excellent condition; equipped.

Examples Taken From Providence Papers

1916 CHALMERS roadster, \$850; overhauled and painted.

1916 CHALMERS touring, \$850; overhauled and painted.

1917 CHALMERS 7-passenger, \$950; overhauled.

1916 CHALMERS 7-passenger, \$800; fine condition.

1915 CHALMERS sedan, \$950.

1916 DAVIS cloverleaf, \$800; overhauled and painted.

1915 EMPIRE roadster, \$425.

1915 REGAL touring, \$400.

WE ARE offering these 12 cars at \$200 each, as we are cleaning house and need the room: Cadillac touring, Chalmers touring, Marlon touring, Studebaker touring, Maxwell roadster, Ford touring, Jackson touring, Corbin touring, Buick touring, Peerless touring, Midland touring, Selden touring. Come early and take your pick. These cars are a snap at this price.

1916 OLDSMOBILE 4-cyl. touring, \$650.

1916 OLDSMOBILE 4-cyl. touring, \$650.

1916 OLDSMOBILE 8-cyl. touring, \$750.

1916 CHEVROLET BABY GRAND touring, almost new, \$475.

1916 OVERLAND touring, \$400.

FORD touring, late model, fine shape, \$250.

1917 SAXON roadster; new; \$450.

1916 OVERLAND roadster; perfect condition; run only 6500 miles; tires new; \$475.

1916 STEARNS-KNIGHT, 4-passenger roadster; in first class order; \$1400.

1915 PATHFINDER touring car; Continental motor, Westinghouse electrical system, tire pump; a great bargain for \$750.

1915 REO touring; 4 cylinder, starter and lights; bargain; just overhauled; \$375.

1916 PAIGE SIX touring; runs like new; in perfect mechanical condition; electric lights, starter, etc.; will sell for almost half list price; for quick sale \$625; good reason for selling.

\$300 takes 1916 METZ roadster; run less than 3000 miles; electric lights and starter; A1 condition; must be sold; terms if desired.

REGAL coupe; underslung; \$225; in good condition.

1916 REO SIX, 7-passenger touring car; \$450 cash, balance easy; price, \$875; will demonstrate.

OVERLAND model 83 coupe; perfect condition; cost \$985; sell for about half.

1916 PAIGE touring car; in first class condition; newly painted; half price; 1914 Cadillac touring car, in perfect condition, newly painted, \$550; 1912 Cadillac runabout, newly painted, \$300; 1913 Cadillac coupe, \$400; 1917 Studebaker coupe, run 1800 miles.

USED CAR DEPARTMENT; 1917 Chandler, 7-passenger, guaranteed, \$1000; 1917 Olds 8, 7-passenger; 2 1916 Olds 8, 5-passenger, \$800; 1917 Scripps-Booth; 1917 Ford touring, \$295. We will take your car in exchange. Deferred payments if desired.

Advertisements Taken from Hartford Newspapers

1916 SAXON roadster for sale; in perfect condition; driven less than 3000 miles;

electric lights and starter; price \$250 if taken at once.

HUPMOBILE 1917 for sale; been run 3000 miles; has cord tires; car like new; reason for selling, owner in the army; a rare bargain; price, \$1050.

FORD 1915 runabout for sale; has just been overhauled; new paint, two new tires; runs like new; price \$200; also 1913 model 31 Buick touring car, slip covers, electric lights, in good running order; price \$215.

CHANDLER; two model 16 1915 7-passenger cars; A1 mechanically; good tires; price \$650 each.

USED CARS.

1916 BUICK D-55 touring car; wire wheels; \$900.

1915 REO touring, \$450.

1917 SAXON, 6-cylinder, wire wheels, excellent condition, \$750.

1915 CADILLAC, 7-passenger touring, "eight," in first class condition, tag 41; repainted; price, \$1050.

1916 CADILLAC, 7-passenger touring car in first class condition; newly painted; tag 29; \$1450.

ONE 1915 CHEVROLET roadster, extra shoe, extra tubes; whole equipment, \$425.

Some Instances Taken From Portland, Me. Papers

STUDEBAKER, series 1917, 4-cylinder touring car, run one season; \$500.

USED CAR DEPARTMENT.

1915 OVERLAND, model 80, \$500.
1916 WILLYS-KNIGHT roadster, \$675.
1914 RAMBLER, 5-passenger, \$400.
1916 JACKSON, 7-passenger, \$850.
1917 SCRIPPS-BOOTH, \$650.
1916 FRANKLIN roadster, \$1450.

OLDSMOBILE, 1916, 8-cylinder, 5-passenger car; first class condition; for quick sale, \$775.

1917 BUICK touring, \$650; run only a few miles and hasn't a scratch. Extras.

Advertisements Taken from Troy N. Y. Papers

1917 HUDSON SUPER SIX sedan, \$1750.
1917 STEARNS-KNIGHT touring, \$1300.
1917 COLE touring, sedan, \$1500.
1917 HUP sedan, \$1350.
1916 OLDSMOBILE roadster, \$750.
1916 MITCHELL "C-7-42," touring, \$750.
1916 KING "E" eight, touring, \$900.
1916 CHEVROLET (baby grand) touring, \$425.
1916 BUICK "6-44" roadster, \$800.
1916 OLDSMOBILE "8-44" touring, \$750.
1916 PEERLESS eight, touring, \$1100.
1916 PAIGE "Fleetwood," touring, \$800.
1916 CHEVROLET "490," touring, \$325.
1916 MAXWELL, touring, \$420.
1916 PAIGE "Fairfield," touring, \$900.
1915 OVERLAND "81," touring, \$325.
1915 CADILLAC "51," touring, \$1150.
1915 MAXWELL, touring, \$800.
1915 LEWIS SIX, touring, \$400.
1915 MITCHELL, roadster, \$500.
1915 STUDEBAKER SIX, touring, \$425.
1915 OVERLAND, roadster, \$300.
1915 OVERLAND "6-28," touring, \$600.

Expanding Local Resale Areas for Used Cars

Demand Market Capable of Considerable Extension with Cooperative Effort to Bring Out Genuine Values Represented in the Offerings

The territory for the resale of a used car is not restricted to the city or town where it comes on to the vehicle market. Because of the fact that the automobile is a commodity which is deliverable a long distance upon its own wheels and moved by its own power, practically any local market now has a radius of 100, 200 to 300 miles. The facilities of going longer distances for business transactions have been ushered in by the automobile itself, and, as railroad congestions continue the fact is more and more borne in upon every community that its own business area is wondrously extended. Its home market reaches out and finds purchasers in places which only a few years ago were considered far away.

Under present expansive conditions, if 100 per cent. of exchange cars were resold on the same spot where they are taken in trade, overhauled and offered for resale, this would not mean that 100 per cent. of them would thereafter be rolling about over the same streets where they rolled under the guidance of their previous owners. Advertising goes far and wide. The car buyer will travel 200 miles cheerfully to get the used car

he wants, especially when it is born in mind that he can make the return journey inside his purchase, if he wishes to.

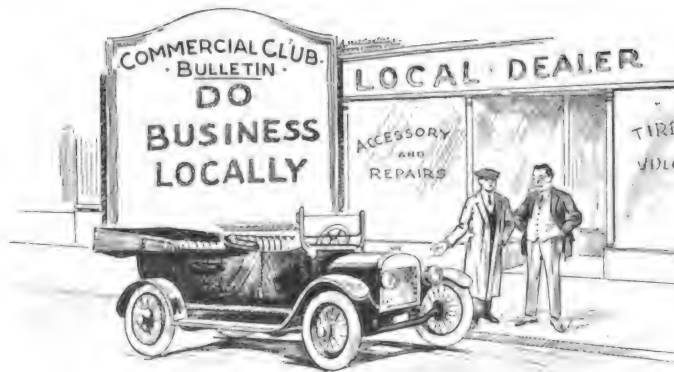
In its July bulletin the United States Chamber of Commerce insists that the railway situation forecasts radical changes in ways of doing business during the period of the war. "In purchasing materials and supplies," it says, "business men will doubtless consider the wisdom of returning, so far as possible, to doing business locally." This principle of local business, old as the hills, about which there is nothing secret or mysterious, is just as applicable to the

problem of how to overcome stagnation in selling automobiles.

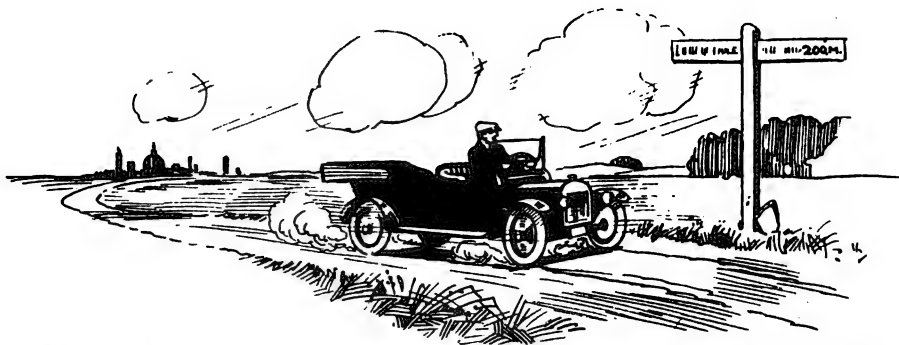
Educating Up to Used Car.

General business conditions naturally create more of a demand for used cars, and when demand is greater a better price is to be expected of them. Although the country has a war on its hands, there are just as many necessities for 100,000,000 people to get about from place to place now as there ever were. In fact, with the railroads congested with troop movements and war materials, there is ever increasing proof of the fact that a people speeded up to war have more need

of vehicular transportation than they ever did. Considering the splendid values which have been put into automobiles made in the past few years, strong, capable machines largely fitted with standardized parts, the used car proposition was never more attractive to a prospective buyer than it is now. The used car demand grows daily of its own momentum. How much more, then, would it not expand were the combined efforts of manufacturer and dealer put behind it to make it grow, instead of wedges being inserted between them to



Business Men Are Inclined to Stick to the Local Field When Getting a New Car.



The Motorist Will Travel Far to Get the Used Car He Wants and Drive It Home Cheerfully.

pry them further apart, as is the natural effect of the proposition to foist set prices on used cars on a false basis?

Every current business indication points to a consistent demand for the roadway vehicle, let the war or government demands on steel and other materials be what they will. On the common highway the new car, fresh from the factory, and the cars of last year and the year before that have a constantly increasing service demand.

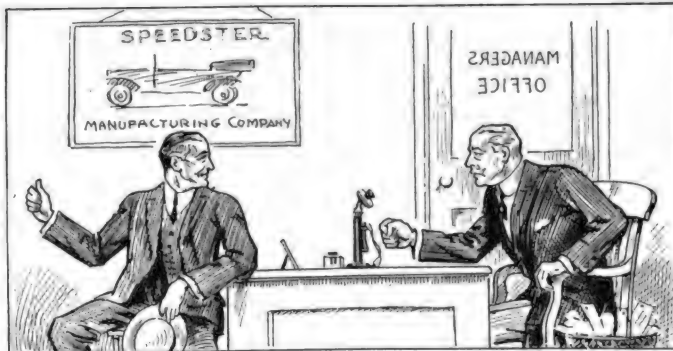
It is readily conceivable that the proportionate economic value of automobiles in this crisis is to be found in their ratings in the measures taken to raise revenue for the war. According to the revised war revenue tax bill, automobiles are expected to provide \$40,000,000 in revenue. How much is levied against passenger transportation in general? This item in the bill reads: Passenger transportation, \$37,500,000. In other words, automobiles are a greater factor to the government in dollars and cents to the extent of $2\frac{1}{2}$ millions more than all the other factors of passenger transportation combined. And this holds true, also, when the item of "pleasure boats," \$500,000, is added in. And, furthermore, it is worthy of notice that automobiles as revenue producers stand next to the levy of \$50,000,000 on first class mails. Freight transportation, with an assessment of \$77,500,000, and express and parcel post, with a levy of \$17,500,000, stand by themselves. They are not in competition with the automobile in such an estimation as is here presented.

On page 17 of this issue of the Automobile Journal appears the first of a series of articles on the selecting of a used car which covers in detail the main points that a prospective buyer of a used car should know. It is also true that the same points will guide an owner when he is on the other end of the deal.

It makes little difference what the system of appraisal and exchange may be in any community, the basic fact is that the condition of a car as it is and its potentialities when overhauled and renewed in parts where needed, are the most important issues at stake always. A confirmed motorist is made of the buyer of a good used car.

MINNEAPOLIS USED CAR SHOW CALLED OFF.

The Minneapolis Automobile Trade Association has decided not to hold the used car show that had been planned as a means of marketing the surplus used cars on hand. Difficulty was experienced in securing a suitable place to hold the show, but the principal reason in abandoning the project was the fact that dealers sold off their used cars so rapidly while the arrangements were in progress



Field Representative Tells Why Agencies Want a Car Which Commands a Good Used Car Price.

that it was decided there were not enough exhibits to make the show worth while.

DIXIE HIGHWAY SYSTEM WILL SOON BE COMPLETED.

The Dixie Highway Association, organized a little over two years ago, has announced that the highways embraced in the system, including approximately 5100 miles, is practically 90 per cent.

finished and less than 20 per cent. is without a modern type of surfacing.

The system, extending from the Great Lakes to Florida, with termini at Chicago, Detroit and Miami, is a parallel highway for most of the way, which at the southern end encircles the State of Florida and at the northern end encircles the State of Michigan.

NEW YORK SHOW PLANS BEGUN.

Jan. 5 to 12 are the dates for the 1918 New York National Automobile Show, announced by the National Automobile Chamber of Commerce. Work has already been started on plans and preparations for the exhibition, which, as usual, will be held in the Grand Central Palace.

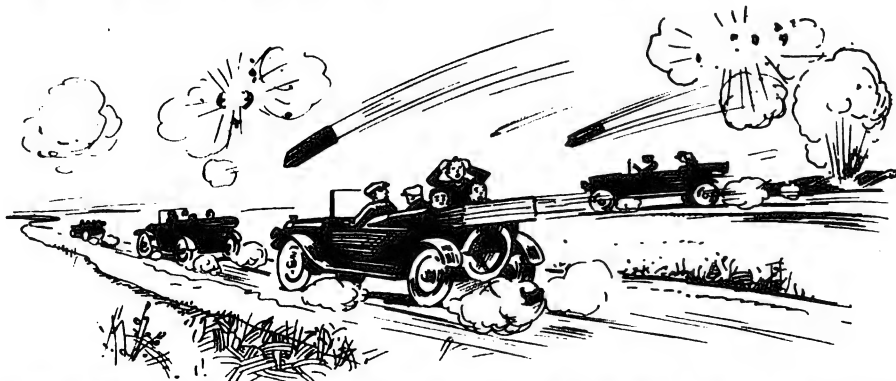
JUDGMENT FOR BUYER ON DELAYED DELIVERY.

A jury sitting before Judge Sisk in the Superior Court at Boston returned a verdict in favor of a car buyer against a dealer, awarding the former two-thirds of the price of the car which he had paid a deposit on, but which the defendant failed to deliver on the specified date.

The transaction was of a rather involved nature and such that the dealer was helpless to meet the conditions of the sale. He had sold a new car to another customer and agreed to take his old car in trade as part payment, but the buyer reserved privilege to continue to use his old car until he received the new one. In the meantime the dealer sold the old car to another customer, received a deposit on it and agreed to deliver it at a certain date. As the new car did not arrive and could not be delivered to the other customer, the dealer failed to obtain the old car to deliver to the second customer, consequently the latter brought suit.

ALIENS EMBRACE CITIZENSHIP.

Out of a total of 1100 foreigners employed by the Studebaker corporation at one of their Detroit plants, only three refused to become American citizens in a canvass recently made.



Used Cars More Heavily in Demand With Railroads Tied Up and a War on Hand.

The Man Behind Elgin Success



C. S. Rieman, Vice President and General Manager.

WHEN Vice President and General Manager C. S. Rieman of the Elgin Motor Car Corporation announced his plans something over a year ago to increase his production from 1000 cars, his first season's output, to 7500 cars, in 1917, veteran motor car men shook their heads and said it could not be done. They called attention to the fact that no automobile manufacturer had ever succeeded in making such an enormous ratio of increase the second season his car was on the market. It seems, however, that Rieman knew his own business better than the motor gossips who said he could not sell so many cars during 1917.

This new star in the automobile firmament has not only sold all the cars the Elgin factory has been able to turn out, but has tried to buy additional material and parts to increase his output, for there has never been a time since the Elgin company commenced operations that the factory has not been swamped with orders.

Rieman has simply set a new high water mark of growth and progress for the motor car industry, already the fastest moving business in America, if not in the world. He has broken all records for the rapid and substantial upbuilding

of a new automobile business known to the industry.

Rieman has not only sold his cars fast enough to absorb his increased production for 1917, but has so far overshot the mark that he is erecting a new factory addition almost $2\frac{1}{2}$ blocks long. This new building, when completed, will give the Elgin factories approximately 160,000 square feet of floor space, and a capacity of 100 cars per day. Rieman says he could sell 200 cars per day just as easily.

Building all the value possible into a popular priced car is Rieman's creed. Intelligent designing of the Elgin Six and careful buying of parts and material have helped him do this. He believes in generous cooperation with dealers and in fair treatment of the car owner. But the keynote of Rieman's success seems to be work. Endowed with a mind of unusual keenness and breadth, and possessing remarkable driving power and endurance, Rieman's future in his chosen work has no limit. He seems destined to take his place in motor history along with Henry Ford, John N. Willys, W. C. Durant and the other big dominating personalities of this romantic business.

Today Elgin success is the talk of motordom, and the credit justly belongs to C. S. Rieman. He has made good.

N. A. C. C. MEMBERSHIP ROLL INCREASED TO 109.

The National Automobile Chamber of Commerce, with recent additions to its membership, now has 109 members, all complete vehicle manufacturing companies. Forty-three of this number are makers of commercial vehicles.

Members recently admitted include: The Service Motor Truck Co., Wabash, Ind.; Atterbury Motor Car Co., Buffalo, N. Y.; Dorris Motor Car Co., St. Louis, Mo.; Hal Motor Car Co., Cleveland, O.; Jordan Motor Car Co., Cleveland, O.; Kleiber & Co., San Francisco, Cal.; Liberty Motor Car Co., Detroit, Mich.; Moline Plow Co. (Stephens Six), Moline, Ill.; Simplex Automobile Co., New York.

The headquarters of the chamber have been located in the entire top floor of the Transit building at 7 East 42nd street, New York City, since the incorporation of the organization in 1913. The expansion of the chamber during the past year made it necessary to secure rooms in the new annex of the building and to open a branch at Washington, D. C. The traffic department has maintained a branch in Detroit for several years to handle matters in connection with railroad freight matters.

At a recent meeting of the directors it was voted to create an export department to promote foreign sales of motor vehicles, which last year reached the aggregate of \$96,595,861.

LOUIS H. PERLMAN IS CHARGED WITH PERJURY.

Louis H. Perlman, of demountable rim fame and former president of the great rim manufacturing company bearing his name, has been called upon to answer to a charge of perjury as an aftermath of the famous suit which he brought against the Firestone Tire and Rubber Co. and which was terminated recently.

He was arraigned before United States Commissioner Samuel Hitchcock last Friday and released on \$10,000 bail to appear in the United States District Court on the charge of perjury, which is founded on his testimony, given when Martin W. Littleton, attorney for Firestone people, was examining him before Federal Judge Learned Hand. During the examination he testified that he couldn't remember whether he had been arrested in England in 1894, arraigned in the Old Bailey court and subsequently fled after being released on \$5000 bail.

FORBIDS PRIVATE SALE OF PULLMAN ASSETS.

Judge Witmer of the United States court, Scranton, Pa., refused to permit a private sale of the assets of the Pullman Motor Car Co., which went into bankruptcy several months ago. He said he was ready, when a proper petition is made, to order a public sale of the company's assets and allow the highest bidder to buy. The assets are said to be worth about \$700,000.

ANALYZING PURCHASABLE VALUES IN A USED CAR

Why a Fixed Percentage of Depreciation Cannot Be Charged Off From the Original Price for Every Year that a Car Is in Use

This is the first of a series of articles dealing with the purchase and restoration of used cars. It is the purpose of these discussions to show that a used car, one or more years old, has extensive service value, and that often, with but a slight outlay of time and the systematic replacement of a few parts, its usefulness can be increased greatly, making it for practical use, comparable with a new car.

It is the purpose of this and following articles to deal more with the so-called "pleasure vehicle" for its restoration to the same class of service than with the idea that the car is to be restored, or remodeled, and used for business purposes.

The second article of this series, which will appear in the July 25th issue of the Automobile Journal, will be devoted to the restoration of the Ford car, and the replacement of such of its parts as are most subject to wear.

THE service value of a used car does not depend upon its age, nor can a fixed percentage of depreciation be charged off from its original price for every year that it has been in use. Proof of this is to be found on every hand. In many parts of the country are to be seen old machines that have been in active service for six or more years. There are a few single-cylinder automobiles which travel along with loads greater than could be pulled by the average horse, and at a greater speed. Many of these old cars will be serviceable for many years to come, and, like the celebrated "one horse shay," will be used until they literally fall to pieces.

Considering the so-called "pleasure car" by itself, then, rather than dealing with the machine which may be restored for business purposes, it is only natural to assume that if an automobile withstands the heavy usages of business, a car which has been used for pleasure purposes alone offers but a slight problem for restoration.

The automobile is the result of many years of experiment; it is the product of highest possible mechanical skill, and since that is the case, it is unbelievable that its entire life is but three or four years. The actual moving parts, and the parts subject to wear are but few in comparison with the total, and, therefore easily replaceable at comparatively small cost.

Though the mileage which the car has traveled counts to a certain extent, it does not determine the service value still remaining. The one great thing that does count, and upon which the life of the car depends, is the use and care which has been given it.

If there has been a systematic replace-

ment of the parts as they began to show wear; if the gears and the bearings have been kept properly lubricated, then it has not depreciated to such an extent as has a car which has received no attention, and which has been allowed to pound along with worn bearings and gears until the constant jar and vibration has had its effect upon every part.

Warmed Up to Work by Use.

The history of a car, then is all important when the value is to be consid-

ered. How the machine has been used is more important than how much. Like a muscle of the human body a machine seems to work smoother after it has been used to a certain extent, providing, of course, the proper attention, care and food, or its equivalent fuel, is given it. It is well, therefore, to find out just what kind of drivers have been in charge of the machine. Since the history is not always easily obtainable, it is always best to go over the car in a thorough manner,



Trying the Compression by Cranking the Engine with the Hand Crank, the Initial Selection Test.

Fifteen Important Tests of Used Car

In the examination of a used car the main points to be observed are here given in a nutshell:

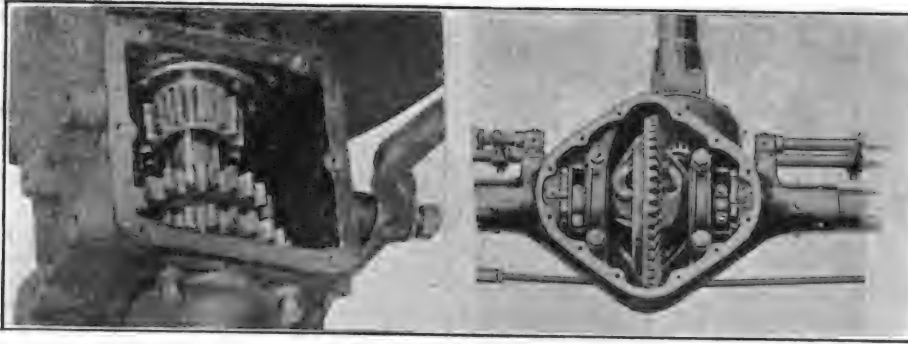
- Test the compression.
- Examine engine suspension.
- Look for broken housings.
- Examine radiator.
- Look at gears in gearset.
- Look at bearings in gearset.
- Examine rear axle for lost motion.
- Go over steering gear.
- Measure for wheel alignment.
- Try both sets of brakes.
- Note condition of tires.
- Look over all springs.
- Try out electrical installation.
- Test the battery.
- Make general road test.

to make an inventory, so to speak, for its value will be dependent upon the number of replacements that will be necessary.

Having located a car the prospective buyer should immediately find out whether supply and repair parts are obtainable. Repair parts for many cars, the manufacturers of which have gone out of business, are still obtainable, and the Automobile Journal will gladly furnish the names of these manufacturers. If there has been no provision made for supplying repair parts the buyer will very likely find that the cost of the car is the smallest item that he has to consider, as hand made machine parts often run into large sums.

Let Not Appearances Deceive.

Never be influenced by the appearance of the body. Many of the used cars now on the market are fitted with new bodies, which are obtainable at very small cost. Then, too, a little paint and oil goes a long way toward making a time worn body look like new. On the other hand, a worn out and battered body may



Removal of the Hand-Hole Plates of the Gearset and Differential Opens to Examination the Gears Most Subject to Wear.

conceal an engine of sterling worth, and, when value is to be considered, it is the machine that is being purchased—not the body.

If it were only possible to take down and examine the engine, the gearset and the rear axle, then the problem of selecting a used car would be greatly simplified. This is seldom possible, however, so the prospective buyer must rely upon a number of simple tests. It is his duty toward himself that he make all of the tests hereafter given and so satisfy himself as to the value of the machine. The little time taken in making these tests will often save both time and money later on, when troubles develop.

Trying Out the Compression.

To give good results an engine must have good compression, not only in one, but all cylinders. To test the compression it is only necessary to turn the crankshaft over by hand, comparing the pressure in the various cylinders with that in the others. Should the compression be approximately the same in all cylinders, it is safe to assume that the cylinders are in comparatively good condition. A comparison with a new car of the same make is very helpful and should be resorted to when possible. The test for compression should be made only after the machine has been run at least five miles, or the engine has been run the equivalent of that distance. The reason for this procedure is that if the lubricating oil is cold or very heavy, it will fill up depressions or scratches in the cylinder walls that might exist, thereby giving the engine more compression than it had under ordinary operating conditions.

While the engine is being run, note whether there is black or excessive smoke from the exhaust. Such a color is an indication of excess oil escapement into the explosion chamber, caused by a surplus amount of lubricant in the base, imperfect, scored or worn cylinders, or improperly fitting piston rings. A surplus amount of oil in the base will give a temporary addition of power and compression to the engine, in many cases, if the cylinders have been scored or worn out of round. The same thing is true if heavy oil is used. Drain some of the oil from the base and let it stand for about 15 minutes. Judgment will soon tell whether it is heavy, medium or light.

Examining the Engine.

If the engine is in good condition it is

possible to throttle it down to 400 revolutions per minute, without causing it to backfire or miss. If an engine will turn slower than that figure, without missing or backfiring, it is an indication that the compression is good. As an actual test for engine performance this test is far more practical than that of allowing the engine to run from 2000 to 3500 revolutions per minute. Such excessive speeds are indicators of but one thing—noise; and while such a test is impressive to the amateur, it means nothing to the man versed in engine lore.

A careful examination of the engine suspension should now be made. Be sure that none of the cross members are broken, or the engine case cracked. If the engine and transmission gearset are integral see that the flanges are not broken. Excessive vibration which might arise from such broken parts can easily be noted if the engine is run at about normal speed.

Oil Escapes and Valve Action.

There should not be an excessive amount of oil on the outside of the engine or transmission; if there is, it is

well to find the cause. The cost of oil is an important item in car upkeep, and should the oil escape from the inside it means not only extra expense, but also that either the bearings are worn or joints between casings are not properly packed.

Valve action is an important factor in engine operation, and, therefore, it is well to examine both the valves and valve tappets, or so-called lifters. Bear in mind that new parts will be necessary if on the old parts there is left no room for adjustment. Wear in the valve guides can usually be remedied by replacing the bushings. If there is no place for bushings, it is well to find out whether it is possible to bush the guides, as the wear on these parts is often excessive and when badly worn there is an escape of gas around the stems.

Gasoline, Radiator, Transmission.

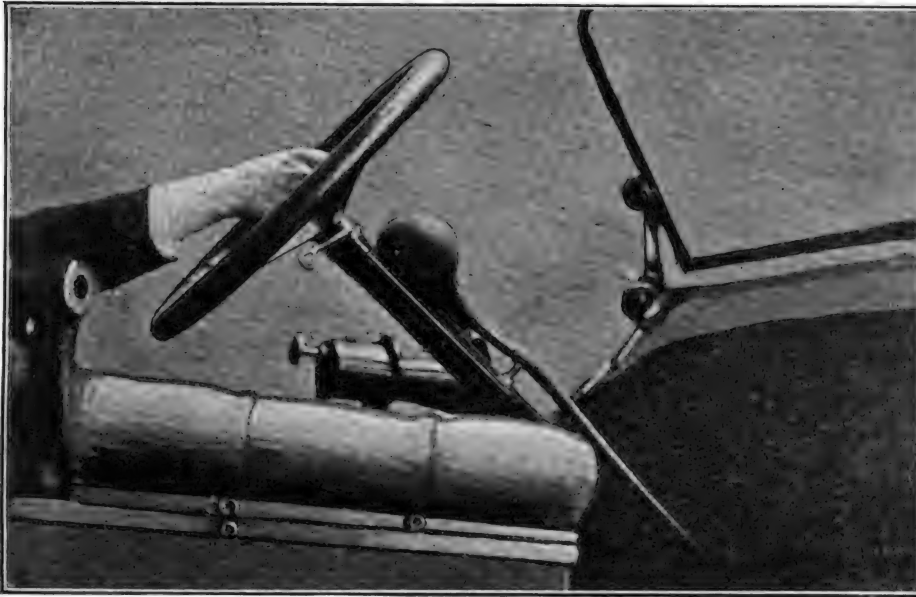
Gasoline consumption is an important item to be considered, yet there is no set rule to follow in determining this. General comparison should be made with other cars of a like horsepower, or cars of the same make.

The radiator should receive a careful examination, as should the connections between this unit and the engine. Let the car stand with the radiator over a dry strip of board for a short time. By this means any excessive leakage of water can easily be detected. At the conclusion of the road test see that the water does not boil or steam to any great extent. Under ordinary conditions the radiating system should be efficient, keeping the temperature of the water below that of boiling.

The examination of the transmission gearset is made easy for the reason that if this unit has been abused, defects will be made evident by undue noises, grinds



Getting Correct Wheel Alignment by Measurements of Distance Between Them at Front and Rear of Rims at Axle Centre Height.



Lost Motion in the Steering Gear or Linkage Can Be Located by Turning the Steering Wheel Back and Forth.

or squeaks. It is not a difficult matter to remove the cover and make an examination of the gears. Any lost motion that may be in this unit can then be detected very easily, as can be worn bearings. The condition of the clutch arms and gear clutches in this unit is nearly as important as the condition of the gear teeth.

Looking for Worn Gears.

There is perhaps no part of the car which receives as much of the strain as the rear axle. This unit not only has to carry practically half the weight of the car, but also has to transmit all of the power from the engine, change the direction of application and then push the car ahead. The rear axle housing of many cars is fitted with a large hand hole plate at the differential and when this plate is removed the main drive gear, or master gear, is exposed. Though this gear receives all of the power from the engine, it seldom gives evidence of wear. It is the small pinion that meshes with it that is most apt to show wear. While the cost of the small gear is small in comparison with that of the large one, should either of them show much wear, it is well to find out the cost and be guided by it in the purchase of the car.

It will be found that the master gear is mounted on a housing which revolves with the wheels. Inside the housing are contained a number of gears which cannot be seen unless the rear axle is disassembled; these are called differential gears. The condition of these gears can be closely estimated by the following tests: Jack up one rear wheel, release the brakes and turn the wheel slowly in either direction. The action should be smooth and the shaft should turn in the transmission gearset as soon as the wheel is turned. Next put in the high speed gear and clutch, being sure that the ignition switch is in the "off" position, so that the engine cannot be started. The propeller shaft is now connected with the engine, and the wheel

may be swung back and forth, therefore any movement of the wheel not affecting the propeller shaft is an indication of lost motion in the differential. If the hand hole plate has been removed it is a good plan to find whether the wheel can be turned and how far without affecting the master gear. There should be little or no lost motion between either of the wheels and the propeller shaft. The experiment should be tried with each rear wheel; then with both wheels jacked up and with the clutch in, while an assistant turns one wheel, the effect upon the other wheel should be noted. Any lost motion in the differential is apt to cause trouble, because there is "backlash" every time the car is started or brought to a stop, thus bringing strain upon the gears.

Tests for Noise in Gears and Axle.

Now put the hand hole plate back into place and with both wheels jacked up start the engine, throw gears into high

speed and with engine throttled down listen for noises, grinds, squeaks, etc., in both the transmission gearset and rear axle. Do the same when the low speed, then the reverse, are in mesh. Before changing the gears from one speed forward to reverse, be sure that the wheels are brought to a stop or a stripping of the gears will result.

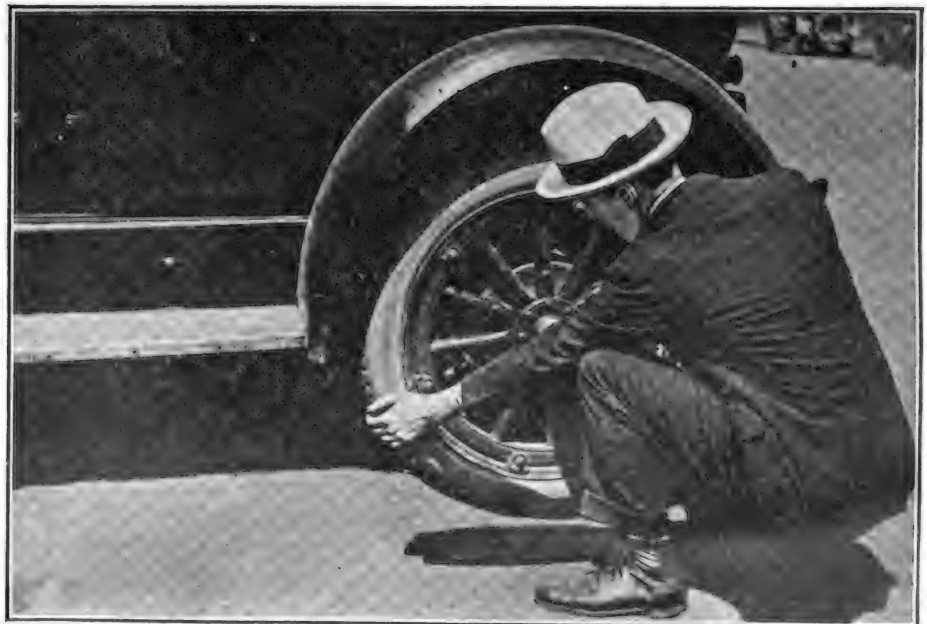
Finding Condition of Brakes.

When the rear wheels are jacked up is a good time to find the condition of the brakes. Bear in mind that many times the lives of the passengers are dependent upon the proper action of these important parts. Apply the emergency brake, and see whether either of the wheels can be turned. Have an assistant throw in the service brake and make the same test. If either of the brakes is inoperative, insist upon its being adjusted or repaired before the beginning of the road test.

Steering Gear Points.

There is no part of the car which plays such an important part as regards the safety of the passengers as the steering gear. Between the steering wheel and the front wheels there should be little or no lost motion. The rule is not arbitrary, however. Some manufacturers design the car in such a way that there is a slight amount of lost motion, claiming that steering is made easier. This amount should not be excessive and is seldom over three-quarters of an inch in the circumference of the steering wheel. Examine the steering column and be sure that it is not cracked or broken at any point. Be sure that the braces and castings of the steering gear are not broken.

The steering gear linkage should be carefully inspected and if badly worn at any joint, inquiry should be made relative to possibilities for compensation for wear at the various points. Have an assistant stand with one foot against the wheel rocking it back and forth, noting



Operation of Testing for Lost Motion in the Differential or Universal Joint.

whether the spindles are loose and whether there is much wear in the wheel bearings.

Wheel Alignments and Springs.

Wheel alignment is the next important thing to be considered; severe strains or shocks upon the chassis might throw the rear or front axles out of line and result in excessive tire wear, difficult steering and other troubles. Two long sticks and two lengths of string are all of the apparatus necessary to detect wheel misalignment. The strings are fastened to each end of the two sticks, equidistant from each other, sufficiently far apart so that they do not quite touch the wheels. The strings should then be set parallel with the rear wheels and when so set should be parallel with the front wheels if the front wheels are set to a point straight ahead. Another test for front wheel alignment consists of measuring the distance between the front of the wheel and comparing this distance with a similar measurement taken from the back of the front wheels.

As to the springs and suspensions, each spring and leaf should be carefully examined, both from the front and back, as a crack in the leaf might show from one side, yet not be seen from the other. Where the car has been overloaded or used on rough roads, spring leaves frequently crack, thereby bringing more of a strain upon the remaining leaves. Spring clamps keep the broken leaf into place so that it is difficult to locate such breaks.

Electrical System Tests.

An important item in the proper operation of the machine is the electrical installation, and though the amateur is apt to feel that he is going "beyond his depth" in making tests of this part, there are a few tests that will bring out many of the great inefficiencies should any exist there.

Disconnect one of the secondary or spark plug wires and start the engine, letting it run at about normal speed.

Hold the wire away from the engine casting about one-quarter of an inch; if the spark is sufficiently strong to jump this gap, then it is usually sufficiently strong for ignition purposes.

Another test, of similar nature, which is indicative of spark plug efficiency, as well as current strength, may easily be applied. Remove each spark plug in succession, leaving the secondary wire connection; hold the plug between two pieces of dry stick and while the engine is being run at normal, bring it to within one-eighth of an inch of the engine block. A spark should pass between the terminals, also between the plug and the base. The length of these sparks will indicate the relative efficiency of the secondary supply.

If the car is equipped with a storage battery and a lighting system, with an ammeter for indicating current furnished and used, with the engine running at normal speed, the ammeter should indicate "charge," providing there are no lights being operated. As the lights are turned on the needle will drop back toward the zero mark. Most of the machines now on the market are equipped with generators of such a capacity that they will furnish enough current to operate all of the lights in the original equipment without drawing on the storage battery. In this case the needle will not drop back to the discharge side of the ammeter until the engine is either run below normal or stopped.

Examination of Battery.

Though the actual value of a storage battery and the condition of the plates can only be determined by a long series of experiments or a battery expert, an examination of this unit should be made by the prospective buyer. First, be sure that the cells are not cracked or broken. If the battery is one of the types that is fitted with a removable top, take the top from the battery and note the condition of the plates.

In a fully charged battery, when the

plates are in good condition, the positive plate is chocolate colored; the negative, gray. As the battery is discharged the plates become sulphated. This condition is evidenced by a white deposit on the plate surface, increasing in density as the battery is discharged. Excessive sulphation near the tops of the plates is an indication of air exposure. Such a condition results in a material lessening of battery capacity.

Before beginning the road test see that the electrolyte is brought to the proper level as directed by the manufacturer, by the addition of distilled water. At the conclusion of the road test take a hydrometer reading of the electrolyte. The specific gravity of the electrolyte is proportionate to the voltage of the cell, and with a specific gravity of between 1.285 and 1.300, according to the make of the battery, the voltage should be at its maximum. (Approximately two volts per cell.) Specific gravity readings below this figure indicate partial discharge, the drop being uniform with the voltage.

Points in Tire Conditions.

For the smaller cars a minimum cost for a set of tires is about \$50. As the size of the wheels increase the cost increases; therefore, the value of the car is greatly affected by the tire condition. Extremely white and "dead" rubber is the result of age; resiliency in a tire is to be desired. Many fine short cracks on the sides of the tire indicate weak walls; long cracks which follow the outline of the rim are caused by underinflation or running on flat tires. Tires with such cracks or cuts on the sides depreciate very rapidly. Air bubbles, sand blisters and the separation of the tread from the fabric mean that the life of the tire is apt to be short.

The general body and chassis condition may be tested by standing with one foot on the running board, holding to the seat or top and swaying the car body back and forth. This test will indicate whether the chassis and body are together tightly, whether the general resiliency of the springs is good and if there is play how much time must be spent in tightening bolts, fenders, etc.

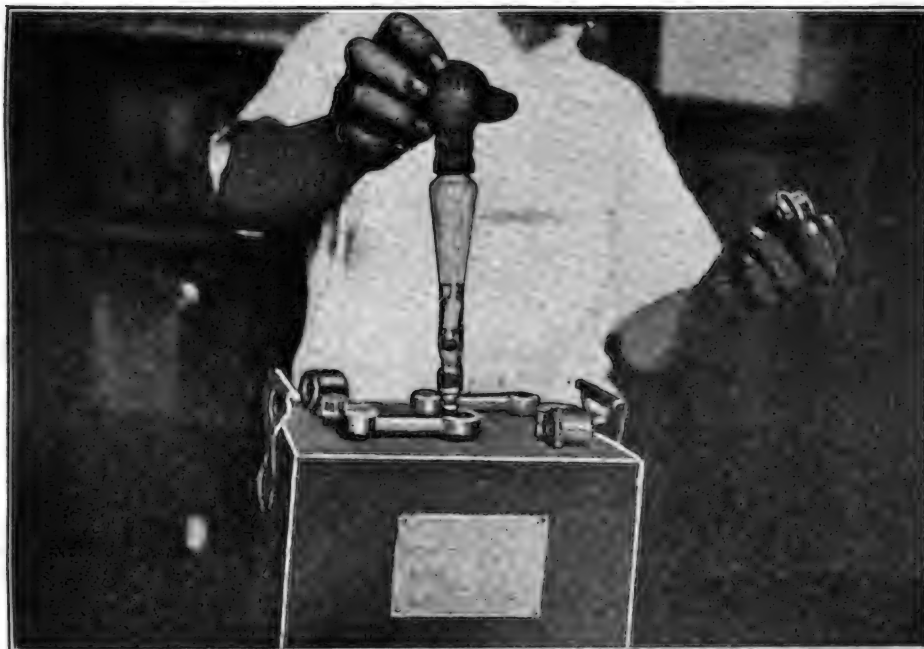
Details of Road Test.

If the machine has successfully passed the inspection to this point, it is time to give it a thorough road test. This does not mean that it should be raced over rough roads or at top speed. Rather it should be given a fair trial over good roads under normal conditions.

At all times during all of the tests the car should be as active as the eye in locating troubles. Many of the defects that may be hidden from the eye proclaim themselves loudly to the ear. For the same reason that the hood is lifted to enable one to use his visual powers on the engine, so all of the small rattles and squeaks should be eliminated to make other hidden faults the more evident to the ear. On the road test take along an oil can and oil squeaking parts. Lubricate the springs, tighten the fenders if they are loose. If a knock is heard don't be satisfied with the explana-



Shaking the Front Wheel with the Foot Quickly Shows the Condition of the Wheel and Mounting.



Taking the Specific Gravity of the Storage Battery Electrolyte for a Check Against the Voltage Reading.

tion that it is a loose member; have the noise eliminated then there will be no doubt as to the source of that particular sound.

Notwithstanding many actual examples to the contrary, it is possible to get the car under way and into high gear without racing the engine. Every car is so designed and the change gears so arranged that it is unnecessary to run the engine above normal in the transition from standing to high speed. Every engine designed has one point where it is most efficient, and it should be run at this speed to get the best results.

If it is impossible to get from one speed to another without causing the engine to labor or pound, it is a sure indication that there is a lack of power, or that there is an unnecessary amount of friction.

Crucial Test in Speeds.

After the car has gained headway and the high speed gears have been engaged, it should be possible to throttle down to a speed of five miles an hour or less on level ground, without causing the engine to skip, misfire or knock. At this low speed many of the defects which might remain unnoticed at any other time are brought forth. Now suddenly open the throttle two or three notches. The engine should respond immediately and acceleration should be accomplished without causing the engine to choke or knock. The opening of the throttle for more than three notches should be discouraged, as it is apt to put too much strain upon the engine.

The performance of the car upon a steep grade or hill is largely a matter of comparison, and calls for judgment on the part of the prospective purchaser. If properly handled and the spark lever advanced or retarded in conformity with the car and engine speed, the engine should not knock until its speed is far below normal.

Much can be learned of the general condition of the transmission if the car is allowed to coast down a long, smooth hill with the engine stopped and the clutch out. By this method the high gear may be meshed, then the low. The ear is a good detector of faults that may exist in the rear axle or gearset.

As a final test: Stand on one side of the street and when the car is driven by, at a speed of about 12 miles an hour, note whether the front and rear wheels run true; take note, too, whether there is undue noise in the rear axle.

At the conclusion of these tests the prospective buyer should be well informed as to the conditions which most effect the proper working of the car; what replacements, if any, are necessary;

the approximate cost of putting the car into the condition which he desires and the relative service value to him.

It was assumed during the tests here outlined that the car in question was equipped with a starting and lighting system. Many prospective buyers will not consider a car unless it is so equipped. When one stops to figure the cost of such a system, however, he may undergo a change of mind, be influenced to buy a car that is not fitted with a starting arrangement, or at least be neutral upon the subject. The average cost of a starting system is about \$50.

Should the buyer decide that he is willing to pay this sum in order to have his car cranked for him by mechanical means, he might consider a used car that is not fitted with a starter, and, if the price is low enough, equip the car himself with such a device. There are a number of concerns making starting and lighting systems that may be adapted to practically any car on the market.

Many cars that are broken up for scrap are fitted with starting devices. These starting machines may easily be adapted in many cases to a used car of another make at less cost than it would be to purchase a standard new starter.

It is a simple matter, therefore, in looking over any car that is not fitted with a starting device to consider the starter simply as a part that needs replacement and see that the price is fixed accordingly.

CONNECTICUT LICENSE FEES NEARLY \$1,000,000.

The Connecticut automobile markers for next year will be green and white. About 90,000 plates have been ordered. Receipts for the first six months of the year at the state automobile department were \$956,667.93, as compared with \$683,652.31 for the corresponding period in 1916.



Body Squeaks, Mud Guard Rattles and Other Chassis Troubles Can Be Located by Putting One's Weight Upon a Running Board.

Over 3,500,000 Motor Cars in the United States

Increase of 43 Per Cent. Last Year Over 1915—Gross Revenues from Registrations and Licenses \$25,865,369.75.

Official figures just issued by the United States Department of Agriculture disclose that in 1916 there were 1,067,332 more motor cars registered in the United States than in 1915. This was an increase of 43 per cent. The gross total of registered cars, including commercial cars, was 3,512,996; the number of motorcycles registered was 250,820. The several states collected in registration and license fees, including those of chauffeurs and operators, a total gross revenue of \$25,865,369.75. Of this amount 92 per cent., or \$23,910,811, was applied directly to construction, improvement or maintenance of the public roads in 43 states, according to figures compiled by the office of public roads of the United States Department of Agriculture, in circular 73, "Automobile Registrations, Licenses and Revenues in the United States, 1916."

The figures for 1916 correspond very closely with the annual percentage increase of motor car registration of the last three years. This yearly increase has averaged 40 per cent. in the number of cars and 50 per cent. in revenues.

When viewed over a period of years the increase in motor car registration and gross revenue has been remarkable. In 1906 the total state registrations were approximately 48,000 cars, on account of which the several states collected in fees and licenses a total gross revenue of about \$190,000. Only a small part of this was applied to road work. In 1916 the \$25,865,369.75 collected formed nearly nine per cent. of the total rural road and bridge revenues of the states.

Recent years have shown an increasing tendency to put the spending of the motor car revenues directly in the hands of the state highway departments. Of the total amount applied to road work in 1916, 70 per cent., or \$16,411,520, was expended more or less directly under the control or supervision of state highway departments. Only 13 states did not exercise any direct control over the expending of the net automobile revenues.

A-C PLUGS MAKE RECORD EARLY IN RACING SEASON.

Although the 1917 racing season is only about half over, the cars equipped with A-C spark plugs, made by the Champion Ignition Co., Flint, Mich., have made enviable records in many contests.

At Uniontown, Pa., in the opening race of the season, Billy Taylor, driving an A-C equipped Stutz, won the Universal Trophy Race and with it the \$10,000 Carl Laemmle cup. Taylor's time for the 112½ miles was 89.9 miles per hour. T.

P. Fetterman, driving an A-C equipped Peerless, won the dealers' race at a speed of 82.5 miles per hour.

On Memorial Day at the Cincinnati race, Vailin, an A-C equipped Hudson Super-Six, won second, Rodgers in an A-C equipped Maxwell, third in the big race, and Harry Rutbert, driving an A-C equipped Hudson Super-Six, won the free-for-all dealers' race.

Percy Ford, Jr., in an A-C equipped Haynes, won the 100-mile non-professional race at 89 miles per hour at Chicago on June 16 and in the same race Ralph Mulford, in an A-C equipped Hudson and Cliff Durant, in an A-C equipped Oldfield-Delage, won second and third respectively.

George M. Price of Seattle, in an A-C equipped Paige roadster, recently broke the 167-mile record between Seattle and Vancouver by covering the distance in three hours and 42 minutes actual running time.

Detroit, Automobile City, Now Fourth in Population

Outstrips Four Other Cities by Showing Census of 800,000 People.

Detroit is now the fourth city in size in the United States in point of population, having 800,000 inhabitants. Since 1910, when the last Federal census was taken, the city's population has increased nearly 100 per cent. and placed it above St. Louis, Baltimore, Cleveland and Boston.

DEATH OF MAX HOLTZ.

Max Holtz, president of the Associated Blue Book Publications, New York, died in a hospital at Yonkers, N. Y., on June 19. He disappeared from his apartment in the Hotel Biltmore on June 6 and more than a week later was found on a suburban road, a victim of amnesia. He had been in ill health for several months.

Mr. Holtz joined the staff of the Dry Goods Economist in 1894, remaining with that publication until about a year and a half ago. At that time, together with Robert Wolfers and Barrett Andrews, he formed the Associated Blue Book Publications, which took over the Automobile Blue Books, Automobile Trade Directory and Motor Life.

DODGE RUN ON HIGH GEAR.

One of the first Dodge cars delivered in New England made a 465-mile swing around New England, touching every one of the six states, all on high gear, without stopping the motor and doing it from dawn to dusk. The start was made with four people in the car: C. S. Henshaw, Dodge dealer; J. H. Keene, the driver; W. L. Shepard, a salesman, and James T. Sullivan of the Bay State A. A.

C.R. Wilson Co. Put Out \$1,000,000 Bond Issue

Sell Securities to Retire Maturing Notes and Enlarge Plant to Production Needs.

The C. R. Wilson Body Co., Detroit, Mich., have sold an issue of \$1,000,000 six per cent. bonds to Otis & Co., bankers and brokers, of Cleveland, O. The underwriters, it is understood, will offer the bonds to the public at 100 and interest. The bonds may be redeemed on any interest date at 101 and interest, at the option of the company.

The money will be used by the Wilson company to retire notes that are maturing and to make provision for caring for the increased production that has been made necessary in order to cope with the demand.

The Guardian Savings and Trust Co. of Cleveland, O., trustees, have been given a first mortgage upon all the property of the Wilson company as security for the issue. A recent appraisal of the company's property and assets showed that the plant and equipment had a reproduction value of \$1,076,269; total assets of \$2,571,951, and net assets of \$2,278,360. Sales for the first four months of the present year totaled \$1,446,668.13, as compared with \$1,097,755.62 for the corresponding period in 1916.

On the recently acquired site of 43 acres the company is now erecting a new steel building, 300x300, with an extension for kilns and dry storage 200x215. When completed this new plant, which is located at Bay City, Mich., will represent an outlay of approximately \$300,000.

STUDEBAKERS UNCHANGED FOR COMING YEAR.

R. T. Hodgkins, sales manager of the Studebaker Corp., has announced that no change is contemplated in the Studebaker cars for the coming year. He states, however, that the high prices in the material markets and advanced cost of labor may require an increase in the selling price of Studebakers at any time.

TECHNICAL COURSE IN RUBBER.

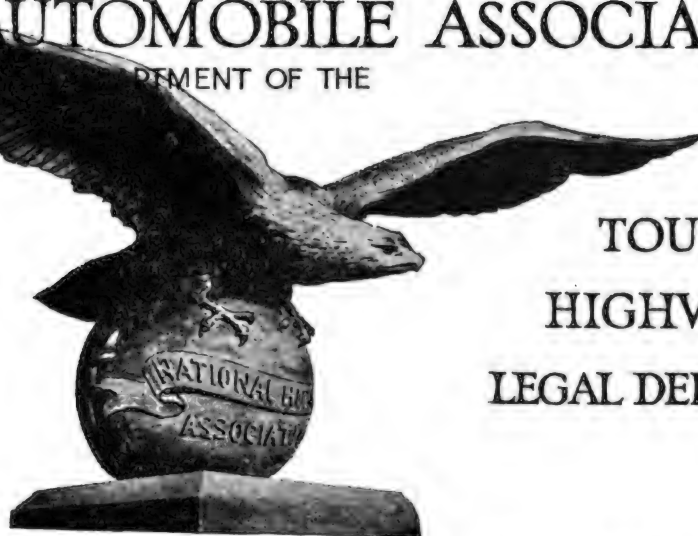
Every person in the many branches of the rubber industry, including importers, salesmen, officials and those engaged in the factories will be interested in the announcement of the Gardner, Moffat Co., Inc., publishers of the "Rubber Age," 120 West 32nd street, New York, that it will present through its publication beginning with July 10 issue a comprehensive technical course in rubber manufacture. This course is the same as that being given at the Municipal University of Akron, O., the world's leading rubber city, and will be written by Prof. H. E. Simmons, B. S., M. S., head of the department of chemistry of the university.

OFFICIAL JOURNAL OF THE NATIONAL AUTOMOBILE ASSOCIATION

DEPARTMENT OF THE

NATIONAL
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HORN VEHICLE LAW AND RECENT DECISIONS

Injuries to Third Persons and Automobiles Driven by Servants of Third Persons—Similar Case in Michigan—Speeding Policemen

IN A recent case in New York it appears that the plaintiff while lawfully using one of the public streets of the city of Rochester was struck by an automobile and seriously injured. He brought an action to recover damages sustained on the ground that the same were caused by the alleged negligence of the defendant and obtained a verdict for a substantial sum. The principal question involved in this case was whether there was any evidence which justified the finding that the defendant was in no way responsible for the plaintiff's injuries. The facts and conclusions were these:

The defendant, her husband, a son and a chauffeur started on a pleasure trip and the accident occurred while on this trip. The automobile was owned by the defendant and this fact was prima facie evidence of her responsibility for the manner in which it was driven. But the presumption growing out of a prima facie case remains only so long as there is no substantial evidence to the contrary. When that is offered the presumption disappears and unless met by further proof there is nothing to justify a finding based solely upon it. Here the presumption arising from the fact of ownership was entirely destroyed by the other evidence. The plaintiff called the chauffeur as a witness and he testified that he was not in the employ of the defendant at the time of the accident and for 20 years prior thereto had been in the employ of the defendant's husband; that he was hired by the husband, was

paid by him and received his orders from him, including those with reference to the trip which was then being taken. His testimony was not in any way suspicious and was corroborated by the testimony of the defendant. The jury was not at liberty, the court said, to disregard this testimony, and it was established that the chauffeur, at the time of the accident, was the servant of the defendant's husband.

It has been settled by numerous authorities in this state at least that when it appears in a case against the owner of an automobile for damages sustained that the driver was not in his employ, nor engaged in his business, a plaintiff cannot recover. And the court held, by decision four to two, that the evidence in this case did not justify a finding that the defendant was responsible for the plaintiff's injuries; the two dissenters contending that the defendant was engaged in a joint undertaking with her husband at the time of the accident.

MICHIGAN LAW.

A question of a somewhat similar nature to the one discussed in the above mentioned New York case was recently determined by the Supreme Court of Michigan. In that case the defendant loaned his automobile to a friend for a ride and was finally persuaded to accompany him. The plaintiff was injured through the negligent manner in which the automobile was driven by the defendant's friend and brought action against the owner. And the court held that since, at the time of the accident,

the automobile was not being driven by the defendant, nor subject to his control, he was not liable for the negligent way in which it was driven, notwithstanding his presence in it.

A POLICEMAN'S RIGHTS.

A somewhat interesting case has recently been decided by the Appellate Division of the Supreme Court of the State of New York, involving the right of a police officer to drive his cycle at any rate of speed in order to apprehend a fugitive from justice.

The duty of the officer in question was to enforce speed regulations in the Borough of Queens. An automobile was being driven at a high rate of speed and a motorcycle officer started in pursuit. It was 10:30 o'clock in the evening. The streets were well lighted and in the pursuit the officer's motorcycle collided with a truck at a crowded street corner. The officer brought an action for personal injuries. A verdict was rendered in his favor, but the court dismissed the complaint for the following reasons:

The plaintiff's proposition, the court said, comes to this: That in pursuit of a speeding car this motorcycle can be run at night at a speed of 35 miles an hour and strike a converging truck at an acute angle from behind and recover damages for such resulting injury. The warning results wholly upon the cyclist's horn, given sideways to the truck on a converging street, where a board fence, 11½ feet high, shuts off the plaintiff, until the cycle is within 100 feet of the truck's path. No private cyclist could

make such a claim. But motorcycle officers assert such an immunity under special ordinances, the ordinances making a speed exceeding 15 miles an hour a prima facie prohibited speed. But the ordinance declares that this provision shall not apply to members of the police department in any performance of their duty.

After analyzing speeds, the court held that while the plaintiff was hurt in the discharge of his duty, that duty did not authorize him to ignore the right of overtaken vehicles at such a crowded junction. The present judgment reversed the true legal liabilities since the plaintiff was reckless, in ignoring the defendant's rights at such an intersecting street. The defendant was not at fault. He had no reason to suppose he would meet such disregard of his rights. The cycle horn, given at the time stated, imparted no such warning. When the defendant saw the plaintiff they were already in extremis.

NEW LAWS AND POLICE ACTIVITIES.

MAINE. In many of the eastern states there is a law requiring that all vehicles must carry lighted lamps at night, and it is gratifying to see the State of Maine falling into line. By an enactment of the last Legislature it is provided that all vehicles, except those used for the transportation of hay, wood, lumber or stone, must after July 7 next, display at least one light so as to be visible from the front and rear during the period of one hour after sunset to one hour before sunrise. Failure to comply with this new law subjects one to arrest and a fine upon conviction.

BEVERLY. The police of Beverly are strictly enforcing not only the speed laws, but the anti-glare lamp law, and motorcycle officers have been detailed to operate against all violators. Almost nightly at the North Beverly Station on the Beverly-Wenham-Newburyport highway both motorcycle and other police are watching for offenders. We suggest that you operate your car with care in this locality.

JAMAICA PLAIN. The police of the Jamaica Plain Station are operating a trap at the corner of Canterbury and Walkhill streets, arresting all overspeeders and persons not slowing down and

giving a timely signal on their horn or bell.

WATERTOWN, MASS. The police of the town are rigidly enforcing the motor vehicle laws and especially the provision requiring motorists to sound a horn or bell at intersecting streets. Many arrests are being made for violations of the law at the corner of Church and Main streets.

BUFFALO, N. Y. Right of way. A warning to motorists who are disobeying the new traffic law has been issued by the police authorities of this city. According to law, when the driver of an automobile approaches a street corner any machine approaching in the intersecting street at the driver's right has the right of way. The only exception to this law is when a traffic patrolman directs otherwise.

ELMIRA, N. Y. With the first of July the police authorities of this city will begin a rigid enforcement of the new state wide traffic law, the substance of which has already been published in this journal.

POUGHKEEPSIE, N. Y. Under the new traffic rules of the city of Poughkeepsie it will be unlawful for persons to park their cars on the following

streets: Liberty street, between Main and Cannon; Garden street, between Main and Mill; Church street, except on the north side, between Market and Academy; Catherine street, except on west side, between Mill and Main; Academy street, between Main and Church; Market street, between Main and Church; Washington street, between Union and Mill; Union street, between Market and Washington; Main street, between Washington and Clinton; Cannon street, except on north side, between Market and Hamilton; North Hamilton street, between Main and Mill; South Hamilton street, between Main and Cannon.

Automobilists stopping cars in front of places of business will be allowed to leave their car in front of that place of business for 15 minutes. It shall be unlawful for the driver of any vehicle to turn in the middle of any block on Main street between the river and the junction of Church; or in the middle of any intersecting streets one block from Main street, between Washington street and Clinton street, inclusive. The penalties will be \$5 fine for the first offense; \$10 fine for the second offense; \$25 fine for the third offense.

ONE AND TWO DAY MOTOR TOURS

Suggestions For a Short Trip and a Stay Over Night in the Summer Playground of the East

BOSTON to PROVIDENCE to WORCESTER and returning to BOSTON—133.4 Miles. Fine macadam roads most of the way. Run out through Jamaica-way and Arborway to West Roxbury, thence to Dedham, Norwood, Walpole, bearing right at green and left at four corners and next right on Main street at band stand at Wrentham, through Plainville, North Attleboro and Pawtucket to Providence. From Providence run north on Francis street under Union Station, by Capitol grounds, turning right at end of street over Smith street bridge and at once left with Charles street to Pawtucket, Central Falls, Lonsdale, Ashton, Woonsocket, Blackstone, Mass.; Uxbridge, Whitins, Northbridge, Farnums-

ville, Saundersville, Millbury to Worcester. From Worcester run southeast on Front street through Washington square to Shrewsbury, Westboro, Southboro, Framingham Center, Natick, Wellesley, Wellesley Hills, Newton Lower Falls, Auburndale, Brighton and Allston to Boston.

BOSTON to TAUNTON to LAKEVILLE to MIDDLEBORO to BROCKTON to BOSTON—92 Miles. Good roads. From Boston run out on Commonwealth avenue to Collins monument, where turn left into Charles Gate West, to Audubon road to Arborway, along shore of Jamaica pond to Forest Hills, Blue Hill avenue, through Matapan, Ponkapoag, Stoughton, North Easton, South Easton, to Taunton, to Middleboro, Lakeville and thence back to Middleboro, to Bridgewater, West Bridgewater, Brockton, Avon, Randolph, Eggleston square to Boston.

PORTSMOUTH to LAKE WINNEPESAUKEE via Rochester and Return Via Franklin and Concord—190.7 Miles. Good roads. From Portsmouth go through Dover, Somersworth, Rochester, Farmington, New Durham, Alton, Alton Bay, The Weirs, Meredith, Holderness, Ashland to Plymouth. Thence through West Plymouth to East Hebron, Bridgewater, Bristol, Hill, Franklin, Gerrish, Boscawen, Penacook, West Concord, Concord, Pembroke, Suncook and Candia back to Portsmouth.

PORTLAND to BELGRADE LAKES Via Brunswick—219.5 Miles. Good roads.



Connecticut One and Two-Day Tours: Left, Washington Street, Hartford; Right, In the Naugatuck Valley, Near Thomaston.

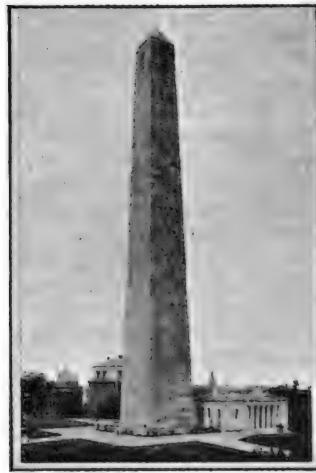
From Portland go through Falmouth Foreside, Underwood Springs, Yarmouth, Freeport, Brunswick, Topsham, Bowdoinham, Richmond, South Gardiner, Gardiner, Hallowell to Augusta. Thence to Belgrade Lakes, Rome, New Sharon, Farmington Falls to Farmington and then through West Farmington, East Wilton, Wilton, N. Jay, Jay, Livermore Falls, Morlands, Howes Corners, Auburn, Lewiston, Danville, North Gray, Gray, West Falmouth to Portland.

PORTLAND to POLAND SPRINGS, NORTH CONWAY, ROCHESTER, PORTSMOUTH to PORTLAND—220.6 Miles. Good roads. From Portland go through Allen's Corners, West Falmouth, Gray, Dry Mills, Sabbath Day Lake, Poland Spring, Poland, Webb's Mills, Cook's Mills, Naples, Lower Bridgton, Bridgton, East Fryeburg, Fryeburg, Center Conway, North Conway, Conway, Chocorua, West Ossipee, Center Ossipee, Ossipee, North Wakefield, Wakefield, Sanbornville, Union, Milton, Rochester, Somersworth, Dover, Dover Point Station to Portsmouth. Thence through Kittery, Me.; York Corners, York Village, York Harbor, York Beach, Cape Neddick, Ogunquit, Wells, Kennebunk, Biddeford, Saco, Scarborough to Portland.

HARTFORD to SPRINGFIELD to PITTSFIELD Over Jacob's Ladder and Return to HARTFORD Via Winsted—159.8 Miles. Good roads. From Hartford go over Connecticut boulevard to East Hartford, thence through South Windsor, East Windsor Hill, Warehouse Point, Enfield, Thompsonville, Longmeadow to Springfield, thence through West Springfield, Westfield, Woronoco, Russell, Huntington, Chester, Bonnyrigg, East Lee, Lee, Lenox to Pittsfield. From Pittsfield run back through Lenox to Stockbridge, Great Barrington, Sheffield, Ashley Falls, Canaan, East Canaan, Norfolk, Winsted, New Hartford, Canton and Avon to Hartford.

HARTFORD to MERIDEN to NEW HAVEN, NEW LONDON and Back Via WILLIMANTIC and Manchester—148.1 Miles. Fine roads. From Hartford go through Berlin, Meriden, Tracy, Wallingford, North Haven, to New Haven, thence through Forbes Corners, East Haven, Branford, Guilford, Madison, Clinton, Westbrook, Saybrook and East Lyme to New London. From New London go through Norwich, Yantic, South Windham, Willimantic, Andover, Bolton Notch, Manchester Green, Manchester and East Hartford to Hartford.

BOSTON to PLYMOUTH Via QUINCY and HANOVER and Return Via MARSHFIELD and COHASSET—93.6 Miles. All state road. From Boston run out through Egleston square around Franklin Park with trolley on Blue Hill avenue, which follow across Morton street to Mattapan. Turn left onto Brook road, thence right onto Adams street, which follow through East Milton to Quincy. Go straight through, following double line trolley. Where trolley turns right (water trough and church) keep straight ahead to Weymouth, (with one line trolley) and follow red banded poles through Accord, Assinippi, Hanover, North Pem-



Bunker Hill—A Short Trip Landmark.

broke, West Duxbury, Kingston to Plymouth. From Plymouth return via Kingston, Marshfield, Marshfield Hills, Greenbush, Scituate Center, Egypt, North Scituate, Cohasset, North Cohasset, Hingham, Quincy, East Milton, Mattapan, Forest Hills into Arborway to Boston.

PROVIDENCE to BOSTON Via WRENTHAM, WALPOLE and DEDHAM, and Returning Via STOUGHTON, TAUNTON and FALL RIVER—115 Miles. Macadam all the way. From Providence run through Pawtucket, North Attleboro, Plainville, Wrentham, Walpole, Norwood, Dedham, West Roxbury to Boston and thence back through the Jamaica way to Forest Hills, Mattapan, Ponkapoag, Stoughton, North Easton, South Easton, Taunton, Dighton, Somerset, Fall River to Providence.

BOSTON to NEWBURYPORT Via LOWELL, LAWRENCE and HAVERHILL and Returning Via IPSWICH, WENHAM and SALEM—109.5 Miles. Mostly macadam, but some dirt and gravel between Lowell and Newburyport. From Boston run out over Harvard bridge to Cambridgeport and turn right onto Prospect street and left on Web-

ster avenue to Somerville, thence up grade on Walnut street into Fellsway and left onto Mystic avenue and right on Mystic Valley Parkway to Medford, through Winchester, Woburn, Wilmington, Tewksbury to Lowell. From Lowell run to Lawrence, Haverhill, Merrimack Village, Amesbury, Salisbury Point to Newburyport. Return through Newbury Old Town, Rowley, Ipswich, South Hamilton, Wenham, North Beverly, Beverly, Salem, Swampscott, Lynn, Revere Beach, Medford, Somerville, Cambridgeport to Boston.

PROVIDENCE to WATCH HILL Via WASHINGTON and HOPE VALLEY and Returning Via Narragansett Pier—110.2 Miles. Mostly all macadam. From Providence run south on Dorrance street, going through River Point, Arctic, Washington, Wyoming, Hope Valley, Hopkinton, Ashaway, to Westerly, to Watch Hill and returning via Charlestown, Wakefield Station, Narragansett Pier, Saundertown, Hamilton, Wickford, East Greenwich, Apponaug to Providence.

SPRINGFIELD to GREENFIELD to PITTSFIELD and Return—140 Miles. Macadam practically all the way. From Springfield run north over the Connecticut river to West Springfield, thence through Holyoke, Northampton, South Deerfield, Deerfield to Greenfield. From Greenfield go through Shelburne, Shelburne Falls, Buckland, Ashfield, Spruce Corners and Lithia to Pittsfield, thence through Lenox, Lee, East Lee, Bonnyrigg, Chester, Huntington, Russell, Woronoco, Westfield and West Springfield to Springfield.

SPRINGFIELD to GREENFIELD to PITTSFIELD Via MOHAWK TRAIL and Returning to Springfield Over Jacob's Ladder—158.5 Miles. A beautiful trip. From Springfield go through West Springfield, Holyoke, Northampton, South Deerfield, Deerfield to Greenfield, thence to Shelburne to Shelburne Falls, Charlemont, where the Mohawk Trail starts up over Whitcomb Summit (elevation 2000 feet) to North Adams, to Williamstown and thence south to South



Motorists Are Advised to Take the Detour by Ausable Forks Between Plattsburg and Beautiful Schroom Lake, Here Pictured.

Williamstown to Lanesboro to Pittsfield. From Pittsfield go through Lenox, Lee, East Lee, Bonnyrigg, Chester, Huntington, Russell, Woronoco, Westfield and West Springfield to Springfield.

BOSTON to WORCESTER to FITCHBURG and Return Via CONCORD—115.6 Miles. Fine roads. From Boston run out through Commonwealth avenue to Brookline, Newton, Auburndale, Weston, Wayland, South Sudbury, Marlboro, Northboro and Shrewsbury to Worcester. From Worcester go through West Boylston to Sterling, to Leominster, to Fitchburg, and thence through Lunenburg, Woodsville, Ayer, Littleton Common, North Acton, Concord, Lexington, Arlington Heights, Arlington, Cambridge to Boston.

HIGHWAY CONDITIONS.

In Massachusetts.

The state highway from Groton to Littleton is in such cut up and poor condition that motorists will find the road running via Littleton to Ayer to Lunenburg

to Fitchburg much more preferable and comfortable.

Highway Conditions in Maine.

Brunswick, Me. There is a detour between Brunswick and Bath which is a disagreeable one, but safe and passable.

During the wet weather the roads in Maine were badly washed out, but since the weather has cleared they are rapidly being put in shape.

There was a bridge washed out between Wells and Kennebunk on June 17, but a temporary one has been put in, avoiding the detour around Kennebunk. Highway to Plattsburg.

Motorists traveling between Plattsburg and Schroon Lake are advised to take the road from Keeseville running west to Ausable forks to Jay, Keene to Elizabethtown, then south over Saranac Lake highway to Chestertown to Lake George, instead of the route between Keeseville and Elizabethtown via Lewis, as this latter route is in very poor condition.

RESPONSIBILITY OF GARAGEMEN

Required to Exercise More Caution In Allowing Cars to Be taken From Their Places

A case which has just been decided by the Massachusetts Supreme Judicial Court will have the effect of making automobile repair men and garage keepers more careful in allowing motor vehicles to be taken from their places of business.

In this case it appeared that the plaintiff delivered an automobile to a motor car company for the purpose of making repairs. Their extent and nature were ascertained and the order given by the plaintiff, who was the owner, to have the work done. The work was done and the car was delivered to the owner's chauffeur upon an order signed by the owner's daughter. The car was wrecked subsequently and the owner sought to hold the company for the conversion of his property. The court held that the motor car company was guilty of conversion and responsible to the owner. The court said, among other things, a delivery of the car to an unauthorized person is as much a conversion as would be a sale of the property, or an appropriation of it to the bailee's own use. In such cases neither sincere and apparently well founded belief that the tortious act was right, nor the exercise of any degree of care constitutes a defense even to a gratuitous bailee. The bare relationship of father and daughter does not make the daughter an agent of her father to authorize a bailee to deliver her father's car to his chauffeur at her order.

THE NEW LIGHT LAW OF CONNECTICUT.

The following is the text of the new Connecticut motor vehicle law relative to lights:

Every motor vehicle, except a motorcycle, shall, when in operation, during the

period from one-half hour after sunset to one-half hour before sunrise, and whenever fog renders it impossible to see a long distance, display at least two lights on the forward part of such vehicle, and every motorcycle so operated shall display at least one light, which light or lights shall in clear weather be visible not less than 200 feet in the direction in which such vehicle is proceeding.

Every motor vehicle so operated shall display a red light from behind, and a white light shall be so arranged as to illuminate the rear number plate in accordance with the provisions of subsection (c) of section six.

Wherever there is not sufficient light within the limits of the traveled portion of the highway to make all vehicles, persons or substantial objects clearly visible within a distance of at least 150 feet, the forward lights which a motor vehicle is required to display shall, when the vehicle is in motion, throw sufficient light ahead of the motor roadway straight ahead of the motor vehicle for a distance of at least 150 feet.

Any light thrown directly ahead or sideways shall be so arranged that no dazzling rays or beams of reflected light from it or from any reflector shall, at any time be more than 3½ feet above the ground on a level road at a distance of 75 feet ahead of such light shall be sufficient to enable the operator of the motor vehicle to see any person, vehicle or substantial object upon the roadway or at the side of the road within 10 feet on each side of the motor vehicle and 10 feet ahead of such vehicle.

No spot light shall be used when another approaching vehicle is in sight, except when projecting its rays directly on the ground at a distance not exceeding 30 feet in front of the vehicle using such spot light and to the right of the centre of the highway.

Connecticut. It will be well to remember that the new automobile law of this state requires lighted lamps at night time on motor vehicles even though they are standing in front of well lighted stores or in well lighted streets.

APPROVED DIMMERS IN CONNECTICUT.

The Department of Motor Vehicles of Connecticut has completed tests upon devices submitted by manufacturers and has passed upon and issued the following list of approved appliances:

Bermac reflector, when used with a 24-candle power bulb.

Corning clear lens, when used with a 21-candle power bulb.

Corning noviol lens, when used with a 21-candle power bulb.

Controlite lens when used with a 21-candle power bulb.

Fractor lens, when used with a 36-candle power bulb.

Hotchkiss lens, when used with a 40-candle power bulb.

Legalite lens, when used with a 15-candle power bulb.

Mask and light concentrator, when used with an 18-candle power bulb.

More light lens (amber), when used with a 21-candle power bulb.

More light lens (clear), when used with a 21-candle power bulb.

Offset reflector, when used with a 21-candle power bulb.

Osgood lens, when used with a 24-candle power bulb.

Queen cut glass lens, when used with 15-candle power bulb.

Reflector, when used with a 21-candle power bulb.

Warner lens, when used with a 21-candle power bulb.

New York City. Every owner of an automobile desiring to drive a car in New York city will be required to take out an operator's license before July 1 according to the provisions of the Cromwell-Kelly bill signed June 14, 1917, by Governor Whitman.

Not only is the owner required to have an operator's license, but if his wife, daughter or son drive, she or he must also take out an operator's license, and the card issued by the secretary of state must be carried by the person operating the car.

The law, similar to the one in Connecticut, provides a quick means of identification for every motor vehicle operator and confers upon the secretary of state power to suspend or revoke the license for the following offenses:

A third or subsequent violation for speeding.

Upon conviction of felony.

The disability of the holder of a license by reason of intoxication or the use of drugs.

Through gross negligence by the operator whereby person or property has been injured.

Getting away without stopping and giving his name and address after causing injury to any person or damage to any vehicle.

Operating a motor vehicle in a manner showing a reckless disregard for the life or property of others.

Before revoking a license the holder shall be entitled to a hearing before the secretary of state or his deputy upon 10 days' notice in writing. Upon the revocation of a license the same shall not be re-issued unless upon investigation the secretary of state shall determine that the operator may again be legally permitted to operate.

Owners of automobiles residing in the outlying counties will not be required to pay the operator's fee of \$1 and will be permitted to drive for 10 days in the city without the necessity of an operator's license. No examination is required by this law in issuing the license, neither does the possession of an operator's card permit the holder thereof to drive for hire.

WHAT PUBLICITY MEANS TO AUTOMOBILE BUYER

Ratio of Expenditures to Sales Is Lower Than Popularly Supposed, Yet Decreases Sum Total of Selling Cost

An erroneous idea is quite prevalent that the enormous sums of money which people hear is spent annually in advertising comes out of them as consumers.

One of the leading experts on advertising in the country has compiled some figures which will enlighten those who have held an erroneous view as to advertising.

"Let us see how much the big advertisers spend," says Alan C. Reiley, president of the Association of National Advertisers, in discussing this matter. "The average man hears talk every day about the millions and millions spent for advertising and he finally gets the notion that somehow or other the buyer has got to pay for it.

"I wonder if Mr. Average Man ever stops to realize that those millions spent in advertising sell hundreds of millions worth of goods—goods that could never be sold so cheaply in any other way. And it is this immense saving in selling cost that helps to make lower priced goods.

"Millions spent for advertising sounds big, but 'hundreds of millions worth of goods sold by advertising' makes the actual amount spent for advertising look small.

"What is the exact ratio of advertising to sales anyhow? This is something that every buyer would like to know.

"I am glad to be able to tell the public. The Association of National Advertisers has collected some valuable facts and figures on this subject. Listen to a few of them.

"The advertising of one of the leading paint manufacturers of the country averages $3\frac{1}{3}$ per cent. of their total sales. In other words, for every dollar's worth of paint they sell, they spend $3\frac{1}{3}$ cents in advertising. This is about equivalent to the price of postage stamp and a cent's worth of paper for every dollar's worth of goods sold. Another big paint and varnish manufacturer spends from $3\frac{1}{2}$ to $4\frac{1}{2}$ per cent.

"Next, take clothing. We have obtained figures concerning two of the biggest clothing manufacturers in the country. One spends $1\frac{1}{2}$ per cent.; the other two per cent. An equally prominent shoe manufacturer spends $1\frac{1}{2}$ per cent.

"But shoes and clothing are necessities," you may say. "How about the luxuries?"

"All right! Take one of the most popular luxuries in the world—candy. One of the best known candy makers in the country and one of the biggest advertisers, spends five per cent.

"Then take the big automobile and tire manufacturers with their full page and double page spreads. Surely now the percentage figures will begin to jump. Will they?

"You will be surprised when I give you the figures for two of the most famous automobile builders in the country. One is two per cent.; the other is three per cent. Also two of the leading tire manufacturers; one spends two per cent.; the other two per cent. And all four rank among the biggest advertisers in the country.

"These figures are authentic and when you consider the enormous volume of the automobile and tire business you will see that the small percentages are ample to provide for the wonderful publicity.

"And then we come to the big department stores—where at one time or another every buyer buys. You can see

them fairly eating up the newspapers with their big spreads. But if you expect to find big percentage figures here, again you will be agreeably disappointed. The figures possessed by the Association of National Advertisers show that the average department store's advertising does not cost more than three per cent. of its total business.

"The fact is that the great majority of all nationally advertised articles—articles which are familiarly known in every home in the country, which are famous for their quality as well as their immense distribution, belong in the five per cent. or under class.

"And let this final point be remembered. Even if this advertising represented a direct advance on what the buyer would otherwise have to pay, this would make little difference in the price of the goods. But it does not. And why not?

"Because advertising is the most efficient method of marketing ever developed by business enterprise—therefore its effect is to decrease and not to increase the sum total of selling cost. This is a simple fact about advertising that every buyer of advertised goods ought to know."

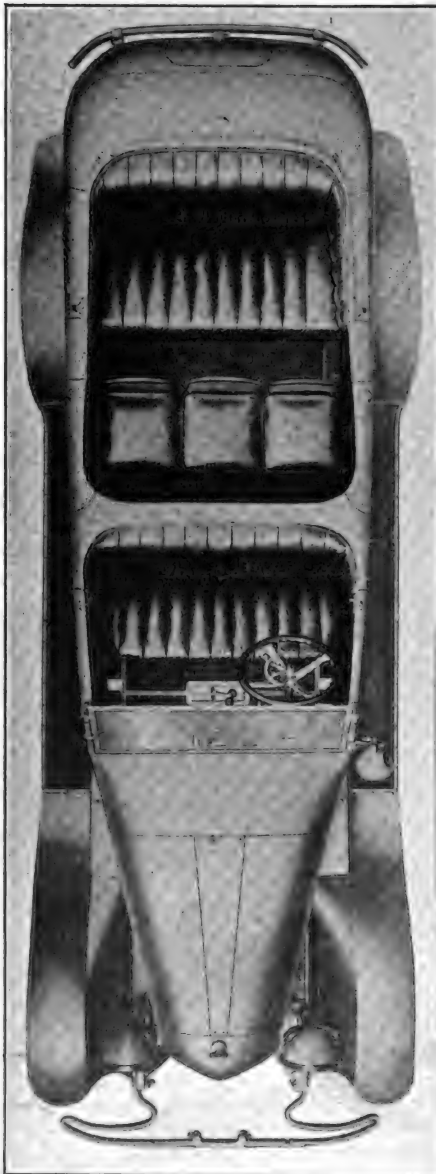
MAINE AUTOMOBILE ROAD BOOK.

The 1917 edition of the Maine Automobile Road Book, an enlarged edition, contains numerous routings of the many beautiful tours in that state, also many trips that lead into other points in New England and New York state. In addition to 25 route maps, it contains two large supplementary maps, one showing the routes throughout the state and the other the connecting routes leading into the state. Points and trips into Quebec, Canada, are also covered. It is issued by the Maine Automobile Association, 12 Monument square, Portland, Me. It is bound in a waterproof cover and sells for \$1.25 per copy.

WEIGHT DISTRIBUTION IN PATHFINDER BODY.

In the new Pathfinder 12-cylinder, seven-passenger touring roadster the body is so constructed that the front seats and cowl form one section and the rear cowl, seats and top compartment another.

This equalizes body strains by having passenger weight centred on the frame and not on the body sills. The three auxiliary seats and floor board are considered part of the chassis assembly and attached to main cross members of frame, which also removes the weight and strain from the body supports.



Plan View of New Pathfinder 12-Cylinder, Seven-Passenger Touring Roadster.

CLOTHES AND THE CAR IN MIDSUMMER ARRAY

American Styles Furnishing All That Could Be Desired in Ultra-Modish Finery For the Needs of Motordom

By MRS. A. SHERMAN HITCHCOCK.

THAT the motor car has much to do with the enlivening of the summer dinner hour in the city restaurants there is no doubt. There was a time when if a fashionable woman chanced for any reason to spend a night in town she wore her severest traveling frock and scornfully left more elaborate toilettes to those city bound martyrs who perforce must spend their summers in town and to the tourist class.

A smart coat and skirt suit and street hat are still acceptable enough for the restaurant dinner in summer. Rather better form, in fact, than the too pretentious toilette, but the woman motorist coming in from a neighboring resort for a day or night in town seems to have effected a compromise and some decidedly chic and dainty costumes emerge from under enveloping dust coats and capes.

One evening recently a large touring car brought a smart party up from the shore to a popular restaurant, where roses clamber over latticed walls and pumpkin lanterns sway in the breeze. The four women were swathed in the most charming chiffon bonnets and shrouded in loose coats of Sportussah silk. When with the assistance of a maid they burst from their neutral lined, dust laden cocoons and fluttered toward their table they were charming enough to set the heads of all the diners turning in their direction. The prettiest and youngest of the quartette was clad in white Moon-glo crepe, accordinian pleated and made with wonderful simplicity. The only spot of color was the vivid red of a Jacqueminot rose at her girdle. A second of the group wore a soutached white Sportoplin, strikingly set off by a scarf girdle of black Georgette passing through soutached tabs which rose from the skirt top and buttoned to the bodice.

A rather modest frock of rose pink Sportoplin, slightly embroidered in self-color, and with a vestee, collar and little pointed cuffs of white pique was third in the quartette, and the costume of the fourth was of a curious deep purple Moon-glo crepe, with no other ornamentation but hemstitching and a small sash which carried a little hand embroidery. Not one of the four appeared to have suffered from the dusty motor run. Women understand nowadays how to dress for the motor.

American Fashions Strike High Note.

It has been the skill and ingenuity of American manufacturers that has given the motor woman the ideal material named Moon-glo, and it promises to out-rival anything that has been sent to us heretofore from the other side. Its exquisite lustre—or glow, and its wonder-

ful pliability, which allows it to conform with fashion's demands for draped effects, are its particular claims to smartness, for to be smart nowadays the motor woman must wear draped frocks and soft materials. The beautiful shades achieved in the Moon-glo materials are varied and very new. Some of those which particularly struck the fancy were Azales, Tea Rose, Iris, French Briar, Plattsburg, Pershing, Presidio, Torpedo, Liberty Blue, Brest, Annapolis, West Point, Walnut, Begonia and Gendarme. The only way the motor woman can really divine the beauty of these shades is to see them for herself, but the day is fast approaching when our own manufacturers and designers will supply us with the artistic creations we formerly have felt must be "imported" to please our fancy. Every American woman should most certainly be patriotic enough to demand American products and insist upon having them. It is not consistent to cry patriotism and clothe ourselves in products not made in our own American mills, and especially when they equal anything produced elsewhere.

Brown in All Shades Popular.

Brown is one of the smartest colors that one can wear this season, and brown motor clothing is particularly chic. The newest and best shades in brown are mink, sable, castor, walnut, mocha and African. One of the new slip-on sweaters of brown stockinette worn with a skirt of tan and white check or of brown and white ticking—the kind that is used for pillows—is exceedingly good for motor wear. Many of the slip-on sweaters are girdled about the waist with a tasseled belt. With a brown motoring outfit one of the Alpine hats of brown straw with a long pheasant feather wound around it, escaping in a slim pointed end at the back, is smart. Oxford ties of that very dark brown which is now so smart in footwear, and silk stockings to match are in very good form. The most distinct novelty of the season is probably the brown patent leather shoes, and for that reason are extremely modish. They are only shown at the most exclusive shops and many of the best dressed motor women are wearing them. Brown suede slippers, ornamented with large buckles of steel or silver, are very dressy for motoring wear when one is going to some social affair. Gray suede slippers, usually ornamented with shining buckles, and the inevitable beige color, are also in evidence to a very great extent. Gray and beige slippers are, however, considered very bad form for street wear.

Some lovely chiffon motoring bonnets are being turned out by a leading de-

signer, and one is the central illustration in this issue. Around the face there is a ruche of figured chiffon and there are long ties of the same, while the bonnet is in a plain color. It may be had in several delectable shades and in the brown and tan is particularly fetching. These bonnets are delightful when motoring summer evenings, and are particularly desirable to wear when attending an affair where a hat is not desired. The bonnet may be so easily slipped off and donned again with the same ease.

The new "Sport" veil shown herewith with dotted net and border is one of the most popular veils for motor wear. The dots and border are in various smart colors, while the net may be had in either black or white.

A sweater that is exclusive and new is made of Sportussah and is bound along the edges with velvet ribbon. It is very smart in deep plum colored Sportussah edged with purple velvet ribbon. There are no buttons or button holes. A sash of the Sportussah, finished with Sportussah balls, does the duty of keeping the sweater together and also making it very attractive. Pointed patch pockets are on either side, and a small hat of the Sportussah is very pretty and unusual.

Furs are now in vogue in warm weather and skunk and pointed fox are smartest of all. They seem most unexpected furs to be in vogue during the summer season, but their very unexpectedness adds to their charm. The coat of Pontine illustrated is in mink—the very dark brown which is sought for by the most fastidious women, with lining of hunter's green satin, and has a wide collar and cuffs of skunk—a fur which adds greatly to the color harmony. Pontine is the new leather like material with a satin backing and is particularly adapted for motor wear.

Special Robes de Nuit.

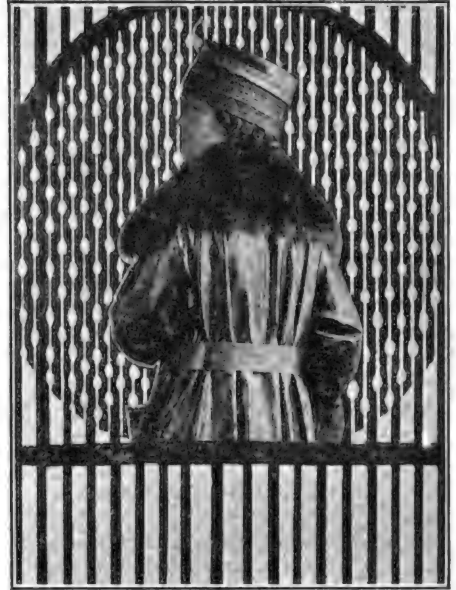
For the motorist the sleeveless night-gown of vanity fair glove silk is very new and it is ideal for the tourist. Several of these gowns can be packed into a very small space and ensure the greatest comfort to the wearer. Silk underwear, in some cases, is not at all practical, but the vanity fair is made of a carefully woven silk of the finest quality. Each garment is cut from an individual pattern, designed to fit the curves of the body, and is reinforced where necessary to prevent wear. There are undervests of every smart style, some with ribbon shoulder straps, some with rounded neck and one style with an elastic top and no straps at all. The vanity fair knickerbockers, camisoles, nightrobes and pajamas are all bewitchingly lovely.

Veils, Hood and Frocks for the Motorist—Cool, Summery and Comfortable



The "Sport" veil for motoring, seen in the illustration on the left, is new and smart. The spots and border come in different colorings, such as cashmere, old rose, gold, reseda, gray and saxe, and the net ground is either black or white. Courtesy Jennings Lace Corporation, Brooklyn, N. Y.

The great vogue for summer furs is shown in this smart motoring model, on the left, of pontine, the leather like material with a satin backing. This model is of the dark brown called mink, and has a lining of hunter's green satin. The wide collar and cuffs of skunk fur give the added touch in color harmony and proves that fur is now worn all the year round.



A new and charming motor hood of plain colored chiffon, trimmed with figured chiffon is shown in the centre. It may be had in various shades and sizes and is most attractive and becoming. Courtesy Crown Velling Co., New York City.

At the left is illustrated a motor woman's coat front cape of navy, white or black men's wear serge, with rows of bone buttons extending from the scarf tie collar down the sleeveless slit sides. The belt is of the slip through variety, inset tailored pockets and lining of plain or novelty silk. Courtesy Franklin Simon & Co., New York City.

On the right is shown a motor frock of yo san silk in rose and white, with short sleeves and new shirred pockets. Notice the narrow white kid belt worn with this smart model, which is from J. M. Gidding & Co., New York City.



**ROBE RAIL BAG.**

For carrying small articles there is nothing more convenient than a robe rail bag. The bag illustrated is made to hang from the robe rail by concealed hangers. It is equipped, besides the very large compartment, with two large and two small pockets. All are fastened by glove snap fasteners. It is made of the best upholstery fabric and measures 24 by 18 inches.

Manufactured by the Martin Mfg. Co., Lancaster, O. Price, \$3.

LITE-A-FORD SYSTEM.

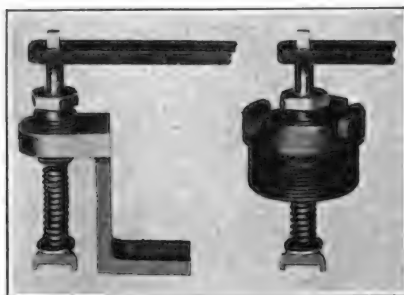
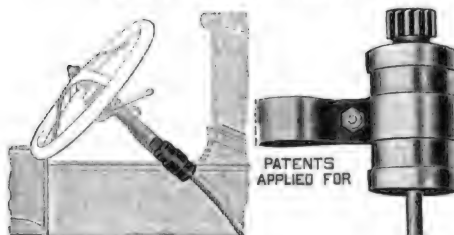
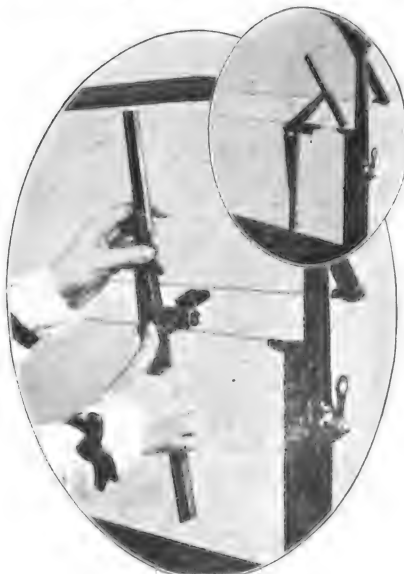
Every Ford car owner knows just what happens to his lights when the engine speed drops below eight miles an hour—the lights burn dim. The reverse happens when the engine speed increases to such an extent that at times there is danger of burning out the bulbs. If one bulb burns out the other becomes inoperative. The Lite-A-Ford is an intensifying and regulating device for Ford cars with a dimming feature. By a series of coils the current from the engine is strengthened at low engine speed, while the same coils have a reverse action on high speed, causing the current to be retarded. This regulates and equalizes the lights to almost an even density at all speeds. At any time the lights may be dimmed to any degree that is desired by the turning of the knob on the dimmer which is attached to the steering column.

Manufactured by Hastings Mfg. Co., Hastings, Mich. Price, \$2.50.

KANDIKID VALVE GRINDER.

No engine operates efficiently when the valves are so worn or pitted as to allow passage of gas when they are closed; there is also a certain element of danger which results from poorly fitting intake valves due to back firing. In either case grinding is the proper remedy. The Kandikid Valve Grinder is an ingenious little device for grinding one or more valves at one time. This device is designed for engines either with or without removable heads. This valve grinder may be fastened to the cylinder block when used upon engines with removable heads. When used with engines that are not equipped with removable heads it is screwed into the spark plug hole. The two types of fittings are clearly shown in the illustration.

Manufactured by W. C. Brown, Niles, O. Price upon application.

**Kandikid Valve Grinder.****Lite-A-Ford System.****Martin Door Pocket.****Universal Rain Rubber.****NEVILLE MORE-ROOM WHEEL.**

Much of the awkwardness and confusion attendant upon the climbing over the passenger on the front seat of an automobile could be eliminated if a tilting wheel were employed. The Neville More-Room Wheel is operated merely by pressing a button, releasing the lock which ordinarily holds the wheel perfectly rigid and permitting the same to be pushed forward eight inches. This wheel is made in sizes to fit nearly any car and in two styles. One has a polished aluminum centre with mahogany rim and the other a plain malleable iron centre finished in black.

Manufactured by Neville Steering Wheel and Manufacturing Co., Congress St., Detroit, Mich. Write for specifications and prices.

UNIVERSAL RAIN RUBBER.

A protection for the motorist and the traveling public comes in the form of a cleaner for the windshield and is known as the Universal Rain Rubber. This device can be instantly attached and easily moved, cleaning both the top and bottom glass the full width across. Multiple rubber faces of gum rubber make the cleaner flexible with two cleaning surfaces on each arm. The rivets are topped with celluloid heads, so that they will not scratch the glass. One desirable feature is that the device can be removed by simply opening the glass and lifting the rain rubber off. It is made in five different models, designed to cover any type of two-piece windshield.

Manufactured by Tri-Continental Corp., Buffalo, N. Y. Price, \$1.50.

WONDER-MIST.

The reselling value of a car depends to a great extent upon the condition and appearance of the body. Wonder-Mist is a liquid spray polish which is said to preserve body finish as well as clean it. It contains certain life giving properties which keep the finish of the automobile elastic and flexible, keeping the paint from checking or cracking due to expansion and contraction of the surface. It may be sprayed on right over dirt, mud, dust or grease. It penetrates and loosens all accumulations, at the same time acting as a lubricant between dirt and finish. It is then a simple matter to wipe the dirt off with a piece of cheese cloth without damaging the finish. Then a little rubbing with a clean piece of soft

cloth polishes the surface. It is stated that six cents worth of this finish is sufficient to clean the average touring car.

Manufactured by Wonder-Mist Co., 14 Federal St., Boston, Mass. Prices upon request.

MARTIN DOOR POCKET.

Among accessories designed for Ford and Chevrolet cars that are useful as well as ornamental, is the Martin door pocket. This pocket is made of high grade leather cloth and is guaranteed not to crack or peel. Such a pocket offers space for carrying route books, pamphlets or small tools, and are very convenient, utilizing unused space to the best advantage.

Manufactured by Martin Manufacturing Co., Lancaster, O. Price, 75 cents.

FITALL ADJUSTABLE TOILET KIT.

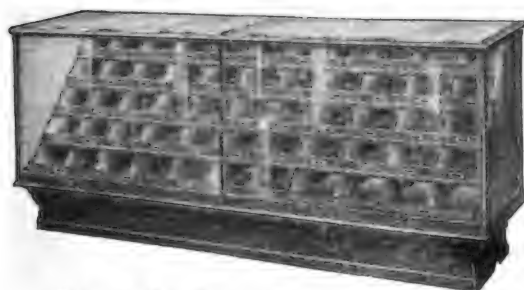
For the convenience of the traveling motorist to store such toilet articles as he or she may desire, the Fitall adjustable toilet kit makes a practical accessory. This toilet kit is light, compact and made of a water proofed and flexible leather. The strap holders are so arranged as to be adjustable to different toilet articles. Fitall kits are made in many different styles, either empty to receive the fittings which are already in hand, or for new fittings, as may be selected.

Manufactured by Eiseman, Kaiser & Co., 23-31 S. Franklin St., Chicago, Ill. Write for illustrated catalogue and prices.

ACCESSORY DISPLAY CASE.

The development of the accessory business in the past few years has brought about the manufacture of a show case designed especially for the attractive display of automobile accessories. The accessory display case not only makes it easy for the motorist to select what he desires, but, in addition, the attractive arrangement and display of other accessories creates extra sales. This case is built in standard lengths from five to 10 feet, with from 35 to 70 drawers, depending upon the length of the case. There are five tiers of drawers, which vary in size, and each drawer is fitted with a bronze pull and card holder, so that the description and price of each article can be read easily.

Manufactured by the Detroit Show Case Co., 459 Fort St., W. Detroit, Mich. Send for prices.



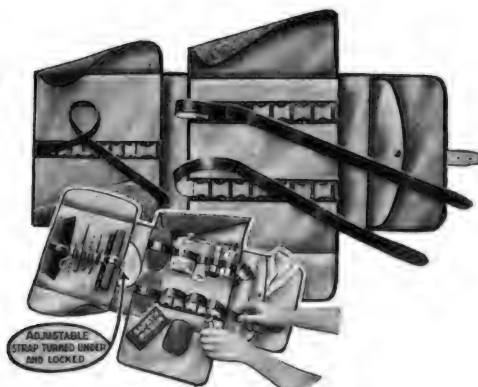
Detroit Accessory Display Case.



Dyer Lightweight Piston.



Martin Robe Rail Bag.



Fitall Adjustable Toilet Kit.



Philbrin Distributor.

STOCKBRIDGE SEMI-TRAILER.

For the business man who does an expressing or delivery business, and owns a Ford car, the Stockbridge semi-trailer equipment should be a practical investment. This trailer is made in two sizes, of 2000 and 3000 pounds capacities. It is mounted on the rear of the Ford, as shown in the illustration, attached to a so-called rocking fifth wheel, which is easily removable. The wheels are 46 inches in diameter, with artillery type hubs, large spokes and equipped with solid rubber flat top tires. The bodies are of the express type with side flare-boards and stakes if desired.

Manufactured by Stockbridge Body Co., 130-6 Union St., Springfield, Mass. Price, \$195 for one-ton size; \$225 for 1½-ton size.

DYER LIGHTWEIGHT PISTON.

Designed to fill a want for a light yet strong piston, the Dyer light weight piston for Ford cars will be appreciated by the owner who is remodeling his car.

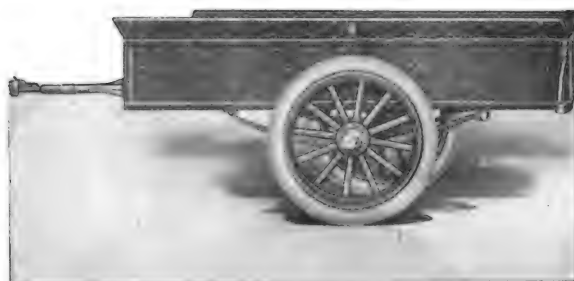
The piston is made of a specially tough metal, carefully machined and has special oiling features. These pistons are made in standard and oversizes and sold complete with wristpin and rings. Each piston weighs but two pounds, which is practically half that of the standard Ford piston. In addition to the extreme light weight is the feature of uniform balance. Each piston is limited to a variation of two ounces.

Manufactured by the G. H. Dyer Co., Cambridge, Mass. Write for prices and catalogue.

PHILBRIN IGNITION SYSTEM.

The Philbrin high frequency ignition system for Ford cars consists of three units—a distributor, a non-vibrating coil and a switch. The distributor is attached to the timer shaft, taking the place of the present timer, and being mounted in an upright position brings this unit out of the oil and grease. The coil, a new non-vibrating type, compact in size, heat and moisture proof and with no moving parts, is contained in a molded case. The switch is of the selective type, permitting the use of two current sources, the Ford magneto or batteries. The system comes complete with thief proof locking device and all necessary brackets for mounting on the engine.

Manufactured by Phillips-Brinton Co., Kennett Square, Pa. Price, \$27.50.



Stockbridge Semi-Trailer.

CORK INSERT FORD FAN BELT.

The Advance Automobile Accessories Corp. announces a new Ford fan belt. This belt is based upon the same idea as underlies the well known cork insert transmission linings for Ford cars. In this belt circular pieces of cork are inserted into a high grade tanned and stretched strip of specially waterproofed oak leather. The cork inserts are backed up by a heavy fabric to prevent their becoming loose or slipping out. This construction is said to eliminate the slipping, which might cut down the efficiency of the belt. Exposed, as it is, to oil, water and grease, the Ford fan belt has a tendency to wear smooth and thereby increase the slippage, cutting down on the fan efficiency. Since cork is not effected by water, oil, grease or dirt, retaining its gripping qualities, and wearing but slowly, the manufacturers of the cork insert belt claim that such a belt results in increased efficiency of radiation.

Manufactured by Advance Automobile Accessories Corp., Dept. E3-1, 56 East Randolph St., Chicago, Ill. Price for 1917 Ford car model belt, \$1. For other models, 85 cents.

BURD PISTON RING DIRECTORY.

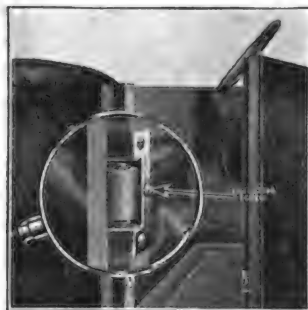
A book entitled, "Burd Piston Ring Directory," which has just been published by the manufacturers of Burd piston rings, contains the listing, both by sizes and by alphabetical order, of piston ring requirements for practically every automobile, truck and tractor manufactured in this country during the past 10 years. In addition to this valuable information it contains a like list of the requirements of aeronautical, marine, stationary and other types of internal combustion engines. This book contains 264 pages and may be obtained by any member of the trade by writing this firm, using his stationary or enclosing business card.

The Burd High Compression Ring Co., Rockford, Ill.

PUCKETT ANTI-RATTLER.

Every automobile owner realizes the annoyance caused by squeaks and rattles on his car. If he is a careful driver and gives his car constant attention, as soon as a rattle develops he tries to eliminate it. The Puckett Anti-Rattler is designed to be applied to the door jam of the car and is said effectually to prevent the door from rattling. It consists of a small roller mounted in a case upon a spring. The spring tension is adjustable through a screw on the face of the device. When the door is closed the roller presses against it, thereby preventing it from rubbing or pounding against the jam. The manufacturers claim that the device can be applied very quickly and easily.

Manufactured by Western Auto Specialty Co., Iowa City, Iowa. Price, 50 cents each.

**Magazine Screw Driver.****Liberty Bell Warning Signal.****Puckett Anti-Rattler.****Cork Insert Ford Fan Belt.****Martin Automobile Bucket.****THE LIBERTY BELL.**

A warning signal that is somewhat different from the usual signals is termed the Liberty Bell. It is said that the tone is distinctive, unmistakable, yet musical; warning, yet does not offend. At the same time the signal is sounded a brilliant red light is flashed through the lens surmounting the bell. By this means the warning is conveyed to both the eye and the ear.

Manufactured by the Liberty Bell Co., Cleveland, O. Write for details and prices.

MAGAZINE SCREW DRIVER.

A handy little screw driver is shown in the illustration, which should be of general use to practically any automobilist. It is called the Starrett Patent Magazine Screw Driver. It is fitted with four blades of different widths from 3/32 to 3/8 inch, any of which may be taken from the telescope handle and inserted in the end, where it is automatically locked and firmly held for use. The blades are carried in the handle, where, by a spring pressure, they are held from rattling when carried in the pocket, or from being lost when the cap is off. While the cap may be readily pulled off or put on, it is rigidly held from turning and frictionally held from coming off, with no screws to bind or bother.

Manufactured by the L. S. Starrett Co., Athol, Mass. Price, \$1. Extra blades, 10 cents.

AUTOMOBILE BUCKET.

No automobilist can afford to be without some means of filling his radiator should it become dry. The illustration shows a handy bucket that will hold about one gallon of water, yet can be folded flat when empty and carried in the pocket. It is made of a special dull finished water proof duck and so designed that water can be poured from it into the filler of the radiator without the use of a funnel.

Manufactured by the Martin Mfg. Co., Lancaster, O. Price, 50 cents.

BUICK TRANSMISSION LOCK.

Unfortunately for the car owner, the brains of "thiefdom" are being used daily to deprive him of his automobile. An automobile can be disposed of very easily, and it is frequently impossible for an owner to identify his car after it has been carefully disguised by the people of that class which subsists upon the labor of others. The Buick transmission is designed to take the place of the original dust cap, which is fitted to the transmission gear control lever. When in place and the key removed, it is impossible for the lever to be removed without breaking the lock. The device is neat in design and fitted with a Yale tumbler lock.

Manufactured by the North Side Buick Sales Co., Sheridan Road, Chicago, Ill. Price, \$6.50.

UNIVERSAL SOLDER.

A preparation that is said to be useful in stopping leaks in radiators, water jackets, hot or cold water pipes, or generally used for making tight joints without the use of either heat or acid, is sold under the name of Universal Solder. The makers claim that this preparation is simple in application and that no special skill is required. It is put up in handy collapsible tubes with screw caps and is said to be a rapid seller for accessory dealers.

Manufactured by Universal Solder Co., 66 Fort St., E., Detroit, Mich. Price upon application.

MOSCO TIMER.

Down in the grease and oil, on the front of the Ford engine, is the little device that controls the proper distribution of the fire to the spark plugs. This important little piece of mechanism is frequently neglected and until the engine begins to skip little attention is paid it. For this reason the Mosco manufacturers have designed a timer which they say requires but a minimum amount of attention. The shell is made of heavy pressed steel with aluminum finish. The insulating ring is of gray bone fiber. The terminals are insulated all the way through. The contact arm is of pressed steel and with the brush assembly may be purchased separately.

Manufactured by Motor Specialties Co., Waltham, Mass. Write for prices.

BURN OIL DEVICE.

Every car owner should be interested in the problem of conservation of fuel and reduction of operating expense. To a certain extent the use of kerosene instead of gasoline as a fuel is the solution of one of the main difficulties. The Burn Oil Device is designed for attachment to the Ford car carburetor. When this device is used the engine is started on gasoline, then the three-way valve turned, kerosene admitted and the engine run on kerosene. In addition to this, water is admitted to the manifold through a needle adjusting valve. The whole device is simple and easily attached, the makers claiming a 50 per cent. saving on the cost of fuel.

Manufactured by Burn Oil Device Co., Inc., 129 N. Jefferson Ave., Peoria, Ill. Price complete, \$30.

MARTIN TIRE COVER.

When the traveling motorist is forced to replace a worn out shoe with the "spare" which he has been carrying upon the running board, he is very apt to feel that his troubles for the time being are over. If he has been far sighted enough to protect this "spare" shoe from the sun, rain, mud and dust, then he has a right to expect full service from it; if not, then he alone is to blame. The Martin Tire Cover, illustrated, is made of the best enameled drill, water proofed and said



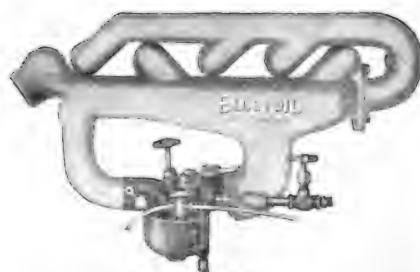
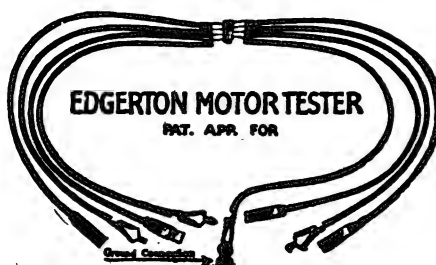
Utility Auto Lock.



Mosco Timer.



Martin Tire Cover.



Burn Oil Device.

to offer perfect protection to the shoe. It is designed to fit the tire and offer not only protection, but present an attractive appearance. Tire covers are manufactured by this firm for use on "spares" that are carried on demountable rims. Specifications furnished upon request.

Manufactured by the Martin Mfg. Co., Lancaster, O. Price for Ford Tire Covers, \$1.75. Write for prices and descriptive literature.

EDGERTON MOTOR TESTER.

Whether all of the cylinders of an engine are working together and are each furnishing an equal amount of power can only be determined by comparison. Such a comparison is made easy by the use of the Edgerton motor tester. This device consists of a number of secondary wires which are connected by special easily attached clips with the spark plugs of all but one cylinder. Another wire from the tester is grounded to the engine base, thereby cutting out all but one cylinder. It is then an easy matter to find whether that particular cylinder is running smoothly. By altering the wire arrangement each cylinder may be tested in turn.

Manufactured by R. G. Edgerton & Co., Suffolk, Va. Prices ranging from \$2 to \$9.50 according to number of cylinders and type of tester.

UTILITY AUTO LOCK.

The Utility Auto Lock is a little device which may be used in many places, consisting of two pressed steel jaws which are adjustable within a small radius, fitted with teeth on their ends and so arranged that they may be brought together if necessary. The action of the jaws is controlled by a unique locking device that is unlocked by a special key. This device may be used to lock the spark and throttle rods to the quadrant, for locking robes to the robe rail, for locking pockets together and many other uses.

Manufactured by the Backus Novelty Co., Smethport, Pa. Write for prices and catalogue.

DE-CARBO-CIDE.

De-Carbo-Cide is what may be termed a gasoline tonic and intensifier. The manufacturers guarantee that it contains no chemical or ingredient that can injure, in any way, the motor, carburetor or connections—that it will, if used according to directions, increase mileage, cut fuel bills and prolong the life of the engine by keeping it free from carbon. It is made in tablet form and is mixed with the fuel in the tank. When it is used it instantly dissolves, leaving no sediment. Each tablet treats one gallon of gasoline and one can contains sufficient to treat 100 gallons.

Distributed by Grace & Co., 325 W. Washington St., Los Angeles, Cal. Price, \$1 per package.

COMING EVENTS

RACING CONTEST SCHEDULE.

Rochester, N. Y., hill climb.....July 14
 Missoula, Mont., track race.....July 15
 Buffalo, N. Y., intercity reliability....
July 17-19
 Anaconda, Mont., track race.....July 22
 Great Falls, Mont., track race.....July 29
 Billings, Mont., track race.....Aug. 5
 Flemington, N. J., track race.....Aug. 17
 Uniontown, Pa., speedway race...Sept. 3
 Cincinnati, O., speedway race, cham-
 pionship.....Sept. 3
 Red Bank, N. J., track race.....Sept. 6
 Pikes Peak, hill climb.....Sept. 8
 Providence, R. I., speedway race, cham-
 pionship.....Sept. 15
 Allentown, Pa., track race.....Sept. 22
 Trenton, N. J., track race.....Sept. 28

MULFORD MAKES NEW RECORD AT OMAHA TRACK.

Ralph Mulford set a new record for 150 miles at the Independence Day race on the Omaha Speedway in the most closely contested meet of the season. He finished first in 1:28:53, at the rate of 101.4 miles per hour. Milton was a close second in a Duesenberg, finishing in 1:29:57. Hearne in another Duesenberg finished third. Taylor, in a Hudson, fourth, and Thomas, in a Mercer, fifth.

In the 50-mile event, Dave Lewis in a Hoskins came in first, with Mulford, Milton and Henderson finishing in the order named. Lewis' time was 29:3, or at the rate of 102.85 miles per hour.

DE PALMA EVENS SCORE BY DEFEATING OLDFIELD.

In the return match between Ralph De Palma and Barney Oldfield at the Detroit track on July 4, the former won all three events. De Palma encircled the one-mile dirt track in 21:2.4 in the 25-mile event; in 13:3.4 in the 15-mile event, and in 8:38.8 in the 10-mile event. On June 23 at the State Fair Park, Milwaukee, Wis., Oldfield in his "Submarine" defeated De Palma in three straight heats.

FOR CARBONIZED MOTORS.

The King Karbon Killer Corporation, 15 Park Row, New York City, is marketing the King Karbon Killer, which, as its name suggests, cures carbon troubles. Its use is advised for all types of internal combustion engines and the makers also claim that it is a fuel economizer. It is put up in packages of 24 cubes, selling for \$1. One cube is placed in the tank for each five gallons of fuel and for badly carbonized motors double that amount is used until 12 cubes have been

New York, speedway race, champion-
 ship.....Sept. 29
 Danbury, Conn., track race.....Oct. 6
 Uniontown, Pa., speedway race....Oct. 6
 Richmond, Va., track race.....Oct. 13
 Chicago, speedway race, champion-
 ship.....Oct. 13
 New York, speedway race.....Oct. 27

SHOW CALENDAR.

Fremont, Neb., tractor demonstra-
 tion.....Aug. 6-10
 Spokane, Wash., interstate fair..Sept. 2-9
 Milwaukee Show, State Park Fair,
 West AllisSept. 9-15
 Dallas, Tex., Auto and Accessory Deal-
 ers' Association State Fair..Oct. 23-28
 New York, National Automobile Show,
 Grand Central Palace..Jan. 5-12, 1918

used, after which the prescribed amount is sufficient.

NAPOLEON MOVES WORKS.

The Napoleon Motor Car Co., formerly of Detroit, Mich., is moving to Traverse City and will manufacture a new model which has a 30 horsepower, four-cylinder en bloc 3¼ by 5 Lycoming engine. The equipment of the car includes a dry disc clutch, Stewart vacuum feed, Zenith carburetor, Connecticut ignition, semi-floating Weston-Mott rear axle, Hyatt roller bearings and 31 by 4 tires. The wheelbase is 112 inches, weight 2200 pounds.

LIBERTY BONDS GIVEN AS PRIZES.

The Packard Motor Car Co. has given Liberty Bonds to its salesmen as prizes, instead of money, in a new sales contest.

The contest ran from June 1 to 15. Every contestant had to sell two twin sizes before he participated. The awards of \$50 bonds were as follows: Three sales, two bonds; four sales, three bonds; five sales, four bonds; six sales, five bonds; seven sales, six bonds; eight sales, seven bonds.

GENERAL MOTORS WILL INCREASE PRODUCTION.

The General Motors Co., which for the year ending July 31, this year, will produce 185,000 cars, will increase this production to 250,000 cars for the fiscal year ending July 31, 1918, it is understood.

The Buick company, one of the subsidiaries of the General Motors, will increase its output in 1918 to 150,000 cars, which is an increase of 33,000 over the number produced this year. This company's production constitutes practically 60 per cent. of the entire output of the General Motors Co., and its earnings contribute twice as much to the parent concern's treasurer as all the other subsidiaries combined. Buick earnings lately have been running at the rate of \$2,000,000 monthly.

NEW BUICK MODELS WILL BE ADVANCED.

The new 1918 Buick models will be advanced in price from \$100 to \$200 as compared with the 1917 prices. The four-cylinder models will sell at \$795, as compared with \$675; the "Light Six" at \$1265, as compared with \$1070, and the "Big Six" at \$1495, as compared with \$1385.

CHALMERS INCREASES STOCK.

At a meeting of the stockholders of the Chalmers Motor Corporation, the plan to increase the capital stock from \$3,000,000 to \$14,200,000 was approved and authority voted to the directors.

NATIONAL AUTOMOBILE DEALERS

Strong Association Formed at Chicago Com- prises 140 State and Local Organizations

The National Automobile Dealers' Association was formed at a big convention of automobile dealers from all over the United States, held in Chicago on July 10 and 11.

George W. Browne of Milwaukee was elected president and it was voted to establish the headquarters of the association in Chicago. The other officers elected are: First vice president, J. A. McAlman, president of the Boston Automobile Dealers' Association, Boston, Mass.; second vice president, F. W. A. Vesper of St. Louis; secretary, Bart J. Ruddle of Milwaukee, Wis.; treasurer, Thomas J. Hay, Chicago. The following directors were chosen: East and South

districts, J. H. Johnson, Boston, Mass.; George D. McCutcheon, Atlanta, Ga.; A. E. Maltby, Philadelphia, Pa.; central district, W. G. Tennant, Chicago; C. A. Forester, Cleveland, O.; J. A. Graham, Minneapolis, Minn.; western district, P. E. Chamberlin, Denver, Col.; P. H. Greer, Los Angeles, Cal.; Dean Schooler, Des Moines, Ia.

The association comprises 140 state and local automobile organizations and has a combined membership of approximately 16,000. The Boston Dealers' Association was represented at the meeting by a committee consisting of J. A. McAlman, Chester I. Campbell, Frank E. Wing and C. P. Rockwell.

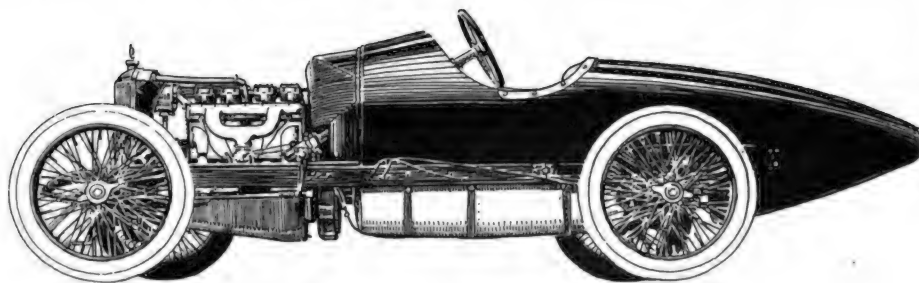
The Frontenac Aluminum Racing Car

By CHESTER S. RICKER, M. E.

It is particularly interesting to note that the Frontenac motor developed by Chevrolet weighs 390 pounds complete and carries 354 pounds of fuel and water for a six-hour run. The tanks and radiator necessary for carrying this fuel probably weighs 150 pounds more, making a total weight of 994 pounds, or 7.65 pounds per horsepower. This is assuming 130 B. H. P. is developed by this motor.

The weight of the motor, with all accessories, is 3.77 pounds per B. H. P. Comparing these figures with those given by Mr. Louis Coatalen for the modern aircraft motor is quite illuminating. He gives antebellum air craft motor weights as follows: Mercedes, 3.5 pounds per B. H. P. and 2.6 pounds per B. H. P. as the latest results. For pre-war motors complete with fuel for five hours' run, he gives 7.3 pounds for rotating motors and 11.9 pounds for water cooled stationary types per B. H. P. Larger units are now being built with 5.36 pounds per B. H. P. The fact that this motor is light enough for aeronautical work shows how advanced the design really is.—Editor.

FIVE years ago, on the 26th of June, 1912, Boillot, driving a Peugeot racing car, won the Grand Prix race over the Dieppe course in France and demonstrated conclusively the advantage of the 16 valve in the head motor, a construction now familiar to every racing enthusiast. Since then, all of the big road and speedway races have been won by cars equipped with motors of this type, for Stutz, Peugeot and Mercedes



View of Car with Engine Exposed, Also Showing Lines of Torpedo Shaped Aluminum Body Which Secures a Minimum of Wind Friction.

cars were equipped with this type of 16 valve overhead motors. For racing purposes they have no peer.

The Aluminum Motor Established.

At the New York Automobile Show in 1916, the motoring public first saw the famous Marmon "34" chassis with the aluminum motor and light weight chassis construction which set a new standard in automobile design. Last year at the automobile show another aluminum motor, the Premier, was exhibited. The development of these motors extended over a period of nearly two years prior to their introduction to the automobile trade and to their being placed in the users hands. Hence the idea of an aluminum automobile motor, now two years old, but untried in the public's hands.

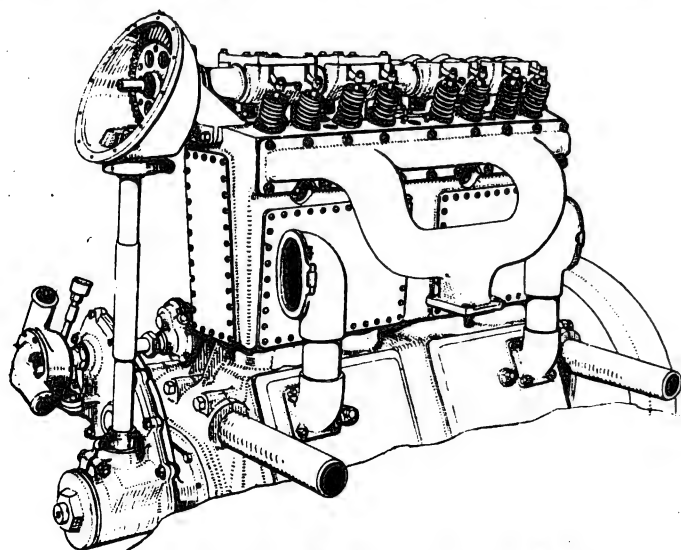
Therefore, when Louis Chevrolet conceived the idea of building an aluminum racing motor, or what might be called an aluminum racing car, there were "knows it alls" who said that the scheme was not feasible. However, during the winter and spring of 1911 Louis Chevrolet designed an aluminum racer and with the co-operation of the Aluminum Castings Company, the makers of Lynite, a special high grade aluminum alloy, and particularly suitable for motors and pistons, he was able to produce a new car which was first introduced to the racing world at the Indianapolis Motor Speedway on May 30, 1916.

The Race Car Problem.

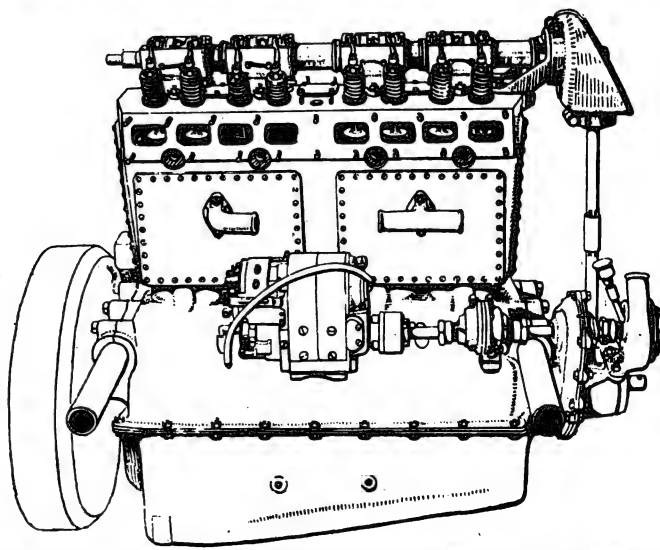
Suppose you were in Chevrolet's position in 1915. With many years of strenuous experience in racing he knew that

the motors of the Peugeot type had been developed in their highest efficiency and therefore that some other tack must be taken by engineers in order to make a car which would be superior instead of being the equal of the Peugeot and Stutz, which were then supreme on American speedways and tracks. By the extensive use of aluminum in the designing and construction of his new racing cars, which he named 'Frontenac, he was able to use a 300 cubic inch aluminum motor and chassis, which complete weighed 500 pounds, less than any similar car. This light weight did not mean so much in the way of speed as it did in the saving of tires, and, therefore, in the reduction of the number of stops required during a long distance race. What is true of the reduction of the tire troubles on the race car is equally true on the commercial or pleasure car. This is exemplified in the long life of the tires on cars of the Marmon, Premier and Franklin type, all three of which are noted for their particularly light weight and the extensive use of Lynite aluminum alloys.

With characteristic foresight, Chevrolet was not far wrong in his conception of the requirements for an up-to-date racing car. The motor was designed along Peugeot lines, but at the same time was far lighter, due to the extensive use of aluminum. That he was immediately successful in the first races is no discredit to the motor or the car design, for as all race fans know, there have been very few race cars turned out at any time in the history of racing which were



Left Side of Engine Where Method of Promoting Air Circulation in the Crank Case and the Camshaft Drive Are Seen.



Right Side of Engine, Showing Compact Mounting of Magneto and Pump, Likewise the Large Exhaust Ports.

perfect in the first race which they entered. There are so many trivial things which are liable to get out of order or which are not exactly adjusted the first time they are used.

Frontenac Racing Performance.

For that reason it was nearly the end of the 1916 season before Chevrolet was able to eliminate all of the little "bugs" that had given him trouble and he won the Uniontown Speedway race, the last one of the season. The first race of the 1917 season he might have easily won had he not slowed down while still two laps in the lead and fouled his spark plugs. It cost him two minutes to clean them and it put him in fourth place instead of first. His team mate, however, ran second and made a very close finish. At Cincinnati the same car which had led almost to the finish at the Uniontown race easily led the field and won hands down.

The way in which this car goes through a long gruelling high speed race

grease and 50 pounds of water, making a total additional weight of 354 pounds. On account of the light weight of the chassis it is possible to carry more fuel and therefore not have to make stops in even a 500-mile race. At that, with the added weight of 354 pounds the car is still so much lighter than the average machine that it is possible to use 32x4½-inch Goodyear tires and not expect to have any tire changes in a race of that length.

Let us look over the chassis and see where it has been possible to reduce the weight by the use of this light weight aluminum alloy, Lynite. The motor complete with magneto wires, exhaust manifold, inlet manifold, carburetor flywheel, clutch, starting crank and tubular supporting arm, weighs 490 pounds. The cylinder block and upper half of the crank case, which is cast integral together with the cast iron sleeves, weighs 89 pounds. This is less than one-third of the weight of the average motor built of cast iron of this type. On most race cars

the cylinder block is separate from the upper half of the crank case and therefore there is a considerable saving, since aluminum alloy is used for the upper half of the crank case. In this design the motor, cylinder block and upper half of the crank case would weigh around 180 and 200 pounds.

Some of the steel parts which go into the make up of the motor weigh considerably more than the main body of the motor, such as the cylinder, water jackets and crank case. For example, the crankshaft alone weighs 92 pounds.

The flywheel, clutch, cone, bearings and spring weigh 140 pounds. Some of the other main constituents of the motor weigh as follows: Oil pan or lower half of the crank case, 20 pounds; camshaft and driving gears, 15 pounds; exhaust manifold, the heaviest individual item, 30 pounds; magneto, 24 pounds; four connecting rods, seven pounds; four pistons, three pounds, and the carburetor, 10 pounds. From these figures you will see how it is possible to build a light motor by using a large amount of aluminum alloy in its makeup. By its use the weight of the rear axle with the wheel adapted is reduced to only 200 pounds, where the average axle weighs 350 to 400 pounds. A certain amount of this weight, however, is removed by the elimination of the differential, which is not used on any of these cars.

Design of Motor.

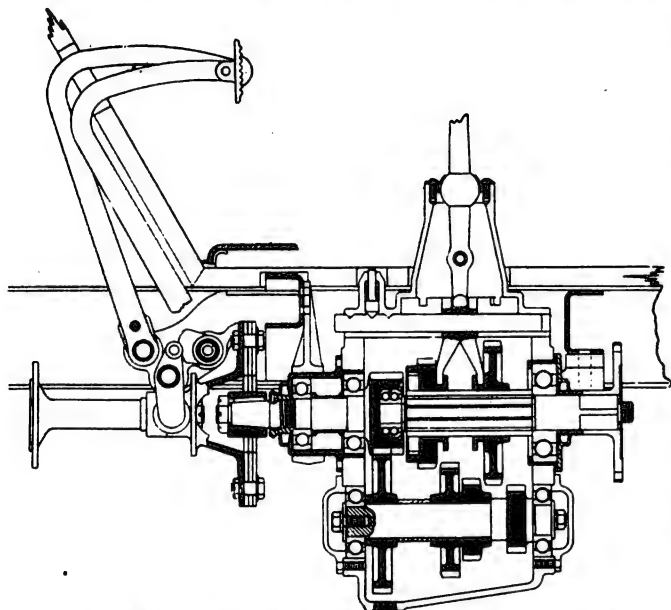
From the mechanical standpoint the motor has many very interesting features which are not common to the aver-

age racing motor of this type. For example, the single overhead camshaft is driven by means of bevel gears instead of by a train of spur gears. The only motor using bevel gears that has been built and operated successfully up to this time was the Mercedes. On the latter motor the gears are placed at the flywheel instead of at the front. On the Frontenac a train of three spur gears are used to drive the water and oil pump and the magneto. It will be noticed that the spur driving and the bevel gears are attached to the front end of the crankshaft and are made from a single piece, which reduces the weight and adds strength.

The aluminum cylinder walls do not come in contact with the pistons, but instead cast iron liners of thin sections are inserted into the cylinder bore to take this wear. These liners are inserted from the bottom and held in place by friction only. As they are introduced while the cylinders are maintained at a high temperature by means of steam in the water jackets, they are automatically clamped tightly in place at normal temperature when the cooling water is in the jackets instead of the steam. Also, as soon as the motor is started up under its own power the temperature on the inside of the cast iron sleeve rises so much higher than that of the water cooled aluminum which surrounds them that the cast iron sleeves expand and tighten up inside of the aluminum rather than the aluminum expanding away from the cast iron sleeves. This construction takes care of the piston and cylinder wall conditions ideally, but it still leaves the question of the valve seats to be considered.

On the Marmon and Premier pleasure car motors this is not an item which has to be considered so seriously, because a detachable cylinder head is used and the detachable head is made from cast iron. This gives these pleasure car motors exactly the same conditions for their valves and valve seats that are found on the conventional type of cast iron cylinder motors. But Chevrolet's motor is not built with a detachable head, as the detachable head motor has not been found entirely successful for racing car use. For that reason some other expedient has to be used to provide cast iron seats for the valves. As will be seen from the end section of the Frontenac motor the seats for the valves are made up from iron castings with dove tailed edges and cast in the aluminum. This makes the cast iron seats an integral part of the aluminum cylinder casting and has been found to give absolutely no trouble during the life of these motors, which has extended over a period of nearly 18 months. One piece is used for each group of four valves. By the use of these individual cast iron valve seats the difference of the expansion of the cast iron and the aluminum does not effect the alignment of the adjacent cylinders.

The dimensions of the motor are 3.875 inches bore, 6.375 inches stroke, making a motor of just under 300 cubic inches displacement. With 105 pounds per square inch, compression pressure, it is



Construction and Suspension of Components in Cross Section of the Gearset.

on the speedway without tire trouble is beginning to cause much favorable comment. What is meant by the aluminum racing car? It is a racing car with iron and steel used only where it is necessary to carry weight or to transmit power. In the Frontenac motor the cylinders, crank case, camshaft, housing, intake manifolds, gear housing, oil pan, pistons and water and oil pumps are all made from aluminum. In addition, the clutch, carburetor, transmission, rear axle housing, brake carriers, hood and body and underpan are all made from aluminum.

Light Weight on Frontenac.

The car complete, ready for the road, but without oil, grease and water, weighs just a bit over 1600 pounds, whereas the average racing car weighs 2100 to 2600 pounds. Hence this car weighs anywhere from 60 to 75 per cent. as much as competitive cars. Ready for the race the weight of the car is slightly more, the addition being 236 pounds of gasoline, 58 pounds of oil, 10 pounds of

possible to obtain 135 to 140 horsepower from this motor, so Louis Chevrolet claims. It will be noticed that two valve sizes are employed, the intake being made lighter and larger in diameter than the exhaust, as is clearly shown in the section drawing of the motor. The diameter measures two inches in the clear, while the exhaust measures only 1½ inches.

Unique Valve Spring Construction.

The construction of the valve springs on this motor is rather unusual. It is customary to use two springs on all racing motors and, in fact, there are several pleasure car motors built in this way—i. e., Marmon. The point where Chevrolet's differs from other two spring constructions is in the use of a very short inside spring instead of one approximately the same length as the outside. The use of a short inside spring makes it possible to get it very stiff and therefore return the valves very quickly to their seats. The wide difference in the length of these two springs also makes it possible to dampen out any vibration which either one or the other of the springs may have when running at some critical speed.

Although not shown on the drawing reproduced herewith, the sides of the rocker arms are now packed with felt so that there is no oil leakage at this point. This makes it possible to pack the individual camshafts, housings and the rocker arms with oil at the start of the race instead of having to supply it up with oil under pressure as on the first motors that were produced. All of these motors are furnished with double magneto and two independent sets of spark plugs, one on each side of the cylinder.

In order to keep the weight of the driving gears and the size of the vertical shaft small, the reduction has been made at the tip instead of at the bottom, so that the vertical shafts run at crankshaft speed.

With the exception of the connecting rod, piston pin and the camshaft bearings, all of the other bearings used on the motor are annular ball. Those on the crankshaft are Nos. 33 and 314 from front to rear respectively.

In order to use these bearings on the crankshaft it is necessary to make the shaft up in two pieces joined at the middle. It is held together by means of one large through bolt and three smaller ones. At the points where these small bolts pass the division in the crankshaft, hardened steel bushings closely fitted are used to take the torque. They act like keys in this case and relieve the bolts of driving stresses.

Dry Crank Case Lubricating System.

The method of lubricating these motors differs from that in which plain bearings are used in the crankshaft, but in other ways does not differ from those where ball bearings are used. "Banjo" or centrifugal thrower rings are attached to each of the crankcheeks and oil is fed from them to the crankpin on each throw of the crankshaft. No chance is taken of one hole being stopped up and hence two feeds are made to each of the crankpin

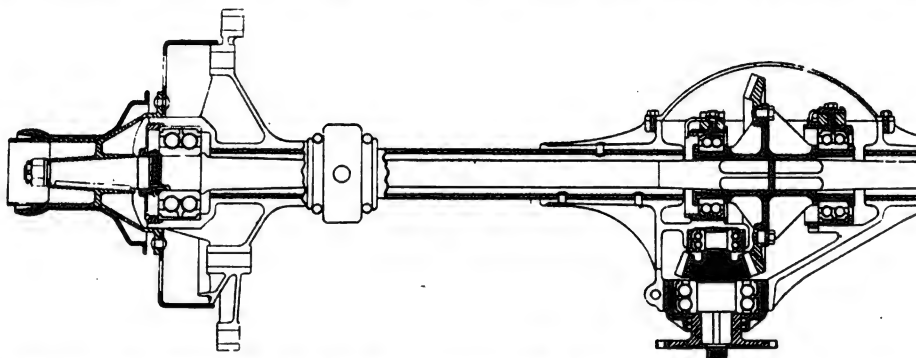
bearings. This will be noticed in the right hand crank throw, which is sectioned. The oil leads are carried to the caps on the bottom of each of the main bearings and a small feed tube is carried to the caps on the bottom of each of the main bearings and a small feed tube is carried out from these caps into the adjacent "banjo ring." In order to better support these rings and also to provide a counter balancing effect, the arm of the crankshaft has been extended across the centre line of the motor, as is clearly indicated in the attached drawings. It will also be noticed that the oil pan is deeply ribbed in order to keep cool the lubricating oil in this motor.

But this is not depended upon entirely for the lubricating system has two gear pumps mounted on the secondary shaft, which also drives the water pump and magneto. One of these oil pumps draws oil from the supply tank, which is independent of the motor, and the other one draws oil from the bottom of the sump and delivers it to the supply tank. This is called the "dry crank case" system and is by far the most successful that has been used on racing cars. It is the same system that is used on the Sunbeam aeronautical and Peugeot motors. It per-

average. From the sectional view of the axle it will be noticed that no differential is provided and that the housing for the driving is made from aluminum. The spring seat and the brake housing are likewise made from aluminum, as will be clearly seen in the attached sectional drawing. With this type of housing it is possible to use four different gear ratios, namely, 2.312, 2.366, 2.642 and 2.161 to 1. This is a sufficient variety to meet all speedway and road work.

There are also a number of small features about the design of the car which are unique. One of them is the suspension of the fuel tank beneath the body inside of the frame. The other is the use of a one-piece aluminum body continuous from the dash to the tip of the tail. Another is the use of a cable instead of a rod to operate the brakes, as it is not only light in weight, but offers a very simple means of equalizing the brakes.

On account of the light weight and short wheelbase (104 inches), small tires, 32x4½; underslung tanks, which bring the centre of gravity low, this car is able to negotiate the speedway tracks faster and with less tire trouble than any other car which has ever been produced for speedway racing. For this the extensive



Sturdy Cross Members Are Shown in This Cross Section of the Left Side of the Rear Axle and the Absence of Differential is Noted.

mits cool lubricating oil to be supplied to the motor at all times, as the heat from the motor cannot be conducted to the oil during its short stay in the oil pan.

In order to still further cool the oil a large semi-circular oil tank has been placed on the front of the dash and provided with copper radiating fins. This holds 12 gallons of oil and all of the air passing through the hood is directed over this tank and out of the side of the body, where suitable openings have been made.

Unlike most race motors of this type no under pan encloses the bottom of the motor compartment, so all of the air coming through the radiator and the louvres of the hood has an easy exit.

Other Parts of Aluminum.

The entire transmission is carried in an aluminum housing and the gear shift lever is mounted on an aluminum plate. The power is transmitted from the transmission to the rear axle by a double universal joint Hotchkiss drive. This is particularly satisfactory where a very light weight axle can be used and in this case the axle is lighter by far than the

use of aluminum must be given the credit.

In mentioning the fact that the motor was without an under pan it should not be considered that this applies to the entire car, because from the flywheel back to the tip of the tail there is an aluminum under pan which gives a perfectly smooth underbody to the car and thereby reduces the wind resistance. This underbody harmonizes closely with the frame and the super structure which carries the seats. Both the under pan and the body are made from sheet aluminum and are very light.

FULLER & SONS

ERECT NEW PLANTS.

Fuller & Sons Manufacturing Co., Kalamazoo, Mich., makers of transmissions, during the first five months of the present year increased production 250 per cent. as compared with the corresponding period in 1916. Further increase in production will be made possible with the completion of the new plants, now being erected.

The Business Side of the Motor Vehicle Industry

What Several of the Leading Car and Parts Makers, Production and Sales Organizations, and Allied Lines Are Doing or Have Under Consideration.

The Gray Motor Co., Detroit, Mich., is erecting a new plant on a factory site of 6½ acres, located upon the Detroit Terminal Railway, just north of Mack avenue. A large and complete machine shop 256x64 feet, of brick construction, with steel sash and one-story in height, is now nearing completion, and the installation of machinery will soon commence. The stock and assembly building, 448x64 feet, is so situated that it can be joined to the machine shop by the erection of an extension on 64 feet of ground intervening. The first 112 feet of this building is to be two stories in height, to have office and drafting room on the second floor. A heating plant will be housed in the third building, 130x112 feet, which will also be occupied by the rough grinding, heat treating and blacksmithing departments, and for rough casting storage.

R. L. Leigh, for several years division sales manager of the Reo Motor Car Co., has been appointed to a similar position with the Olds Motor Works, with territory extending from the Atlantic coast to and including Michigan, Ohio, Georgia and Florida.

G. T. McFarland, formerly with the Westinghouse Electric Manufacturing Co., has been appointed manager of the Brooklyn branch of the P. J. Durham Co., 761 Park Place, a service station for Westinghouse, Auto-Lite, Bijur, Gray & Davis and U. S. L. batteries.

D. B. Mugan, formerly in charge of the electrical department of the Illinois Central Railroad at New Orleans, La., has been appointed resident manager of the Edison Storage Battery Supply Co. in that city, with headquarters at 201 Baronne street.

The Norma Company of America, 1790 Broadway, N. Y., issued a special folder on the occasion of the S. A. E. meeting in Washington. It was entitled "Norma"—In the National Service," and referred to the standardization of magnetos and lighting generators on "Norma" ball bearings in the fields covered by the

combined societies, automobiles, trucks and motorcycles, motor boats, aeroplanes, gas engines and tractors.

The Mortz-Cadle Sales Co., Indianapolis, Ind., has been appointed distributors for the Marion-Handley in that state.

The New Departure Manufacturing Co., Bristol, Conn., will pay a bonus to all its employees on Saturday, July 14. All those who have been in the company's employ for three months or more will receive an extra week's wages, and those who have been employed at the factory for a month and less than three months will receive an extra half week's wages.

The Franklin Automobile Co., Syracuse, N. Y., produced three and one-third times as many cars in May of this year as during the corresponding period last year. During May shipments reached 31 cars per working day and in June shipments were made at the rate of 41 cars per day.

St. Clair Couzens, who has been appointed director of sales and advertising for the Olympian Motors Co., Pontiac, Mich., was a newspaper man before entering the automobile industry, 10 years ago, and made an enviable record as sales promoter for one of the large manufacturing companies.

The Willys-Overland Co. during the month of May shipped a total of 16,025 cars as against 15,937 cars in the corresponding month last year. The total number of cars shipped this year to June 19 totaled 85,792, compared with 88,295 for the same period in 1916.

O. C. Hutchinson has been appointed sales manager of the Hupp Motor Car Corp. to succeed J. E. Fields.

Joseph E. Fields has resigned as sales manager of the Hupp Motor Car Co. to become director of sales of the Liberty Motor Car Co., Detroit, Mich., in which he has acquired a considerable interest.

The Chevrolet Motor Co. closed May with unfilled orders for 8500 cars. All orders unfilled at the end of the month on the company's books expire automatical-

ly and not a month has passed since last September with less than 6000 unfilled orders on the books.

The La French Power Spark Plug Co., Dayton, O., has been reorganized with a capital of \$100,000 and will move to a large three-story building at 16-18 East First avenue, Columbus, O. The La French Power Spark Plug has a "nixite" insulator inserted inside an independent steel shell and is designed especially for usage in high compression engines in motor cars and airplanes.

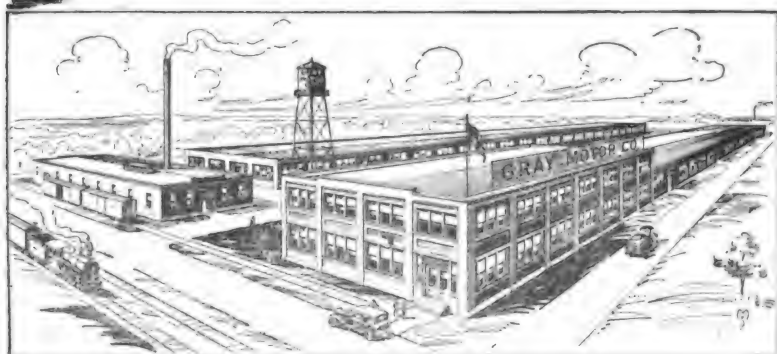
W. R. Angell, a well known Chicago corporation lawyer, has been elected secretary of the Continental Motors Corp. of Detroit, Mich. He succeeds A. H. Zimmerman, former secretary-treasurer, who continues as treasurer of the organization. Mr. Angell, who has been a large stockholder in the corporation for a long time, became actively interested in the organization in January, when the rapidly increasing business of the Continental necessitated refinancing, at the completion of which he remained as a director.

The New Era Spring and Specialty Co., Detroit and Grand Rapids, Mich., have been granted a patent under serial application 141,415, covering tire carriers of the interchangeable type, or expansion of the flexible band principle, with several methods of adjustment. This, in addition to the patent secured in the purchase of the Sly Perfect Tire Carrier business, gives the company a clear field in this particular type of tire holder.

The Meder-Staudt Co., Inc., has been merged with the Witherbee Storage Battery Co., Inc. The consolidation does not involve any change in the personnel of the company, its stockholders, directors or department heads and the policy of the company will remain unchanged. The factory in New York City was entirely reorganized last spring and new equipment and machinery installed. All the service work is handled at the service station, 1904 Broadway, and at the substations throughout that city and in other parts of the country.

R. B. Dickson has been appointed division manager of the Indianapolis territory for the Prest-O-Lite Co., Inc., and will have headquarters at the Indianapolis downtown branch. He will have charge of the development of the Prest-O-Lite products in a territory including most of Indiana and parts of Ohio and Illinois and Kentucky. He succeeds Major W. P. Carpenter, who has entered the army. Mr. Dickson was formerly battery service station supervisor for the same company in the Detroit territory.

The F. E. Castle Co., Detroit, Mich., will handle the distribution throughout the country of the C-H gear shift, made



New Factories and Office Building of the Gray Motor Co., on the Detroit Terminal Railway, Detroit, Mich.

by the Cutler-Hammer Mfg. Co., Milwaukee, Wis. The C-H shift, which is magnetically operated and controlled by the operator through a series of buttons beneath the steering wheel, was originally known as the Vulcan, but has been greatly improved since it was so designated and is now a standard appliance on Premier cars.

John J. McCutchan, a member of the firm of Fulton & McCutchan, jobbers of Chicago, died in that city last week.

S. J. Green has been appointed sales manager of the Detroit Battery Co., Detroit, Mich.

L. J. Myers has been appointed sales manager of the Amazon Rubber Co. and will immediately take charge of the entire sales organization. He was formerly connected for several years with another Akron tire company in the sales and credit departments, and is well known in the trade.

Edward S. Babcox, advertising manager of the Firestone Tire and Rubber Co., has been elected vice president of the Association of National Advertisers. Following his election at the meeting of the association in Detroit, he said: "American industries are mobile and should be able to readjust their methods and forces to meet these new conditions. Advertising campaigns, carefully and wisely planned, will be one of the prime factors in this readjustment, becoming more of a force in modern business than ever."

The Willys-Overland Co., Toledo, O., has started a country wide sales contest in which everyone of the 5000 Willys-Overland dealers will participate. At the conclusion of the contest, which will be some time in August, the winners will be given a free trip to the factory, where they will be entertained on an elaborate scale.

The Elgin Motor Car Corp., Chicago, Ill., announces removal of its general office from 1543 McCormick building to 2427 Michigan avenue. This corporation, which commenced operations 14 months ago in a small rented building, with 8064 square feet of floor space, is now occupying a factory with 108,800 square feet of floor space, and more factory space has been arranged for. As a temporary means of housing operations until the additional space is provided, two huge cir-



Left to Right—St. Clair Couzens, Director of Sales and Advertising, Olymplan Motors Co., Pontiac, Mich.; Edward S. Babcox, Advertising Manager Firestone Tire and Rubber Co.; L. J. Myers, New Sales Manager Amazon Rubber Co.; S. J. Green, Sales Manager Detroit Battery Co., Detroit, Mich.

cus tents have been erected on the plant site. In the past year the company's assets have grown from \$100,000 to more than \$2,000,000.

The Haarmann-Locke Co., 2429 Farnam street, Omaha, Neb., has been appointed distributor in Nebraska of the \$795 Malbohm roadster, manufactured by the Malbohm Motors Co., Racine, Wis.

The Prest-O-Lite Co., Inc., has appointed the following individuals and concerns as battery service stations: John H. Jackson, 1306-08 Washington avenue, Cairo, Ill.; Julius Wetzler Co., Holbrook, Ariz.; Auto Battery Co., 3078 Broadway, Oakland, Cal.; Harris & Whiteside, East Court street, Dyersburg, Tenn.; Anaconda Overland Co., 310 Main street, Anaconda, Mont.

The Northwestern Chemical Co., Marietta, O., through its house organ, "Auto Suggestions," announces that the Chicago branch office, display and ware rooms located at the Soo Terminal building, 52 West 12th street, was opened on July 1. All orders from Illinois, Michigan, Wisconsin, Missouri, Iowa, Minnesota, Arkansas, Nebraska, North and South Dakota, Montana, Wyoming, Colorado, New Mexico, Texas, Utah, Idaho and Canada will be handled through the Chicago office, which will be in charge of M. P. McGee.

The Anderson Motor Car Co., Rock Hill, S. C., will advance the price of the Anderson car \$100 on July 15 to \$1395.

The Cleveland A-B-C Starter Co., Cleveland, O., has been incorporated for \$10,000 and will engage in the manufac-

ture of engine starters. The incorporators are: Ray W. Cudmore, Clayton Edwards, Hubert L. Edwards, C. L. Laxear and A. J. Shustrich.

The Silvox Co., South Bethlehem, Pa., E. H. Schwab, president, has announced the selection of a site of 10 acres adjoining the present plant and will erect a new factory. When the additional manufacturing facilities are completed the company will have a capacity of 12,000,000 Bethlehem Five Point spark plugs annually.

Harry W. Ford, president of the Saxon Motor Car Co., has announced that \$1,000,000 additional cash capital would be furnished to the company by Merrill, Lynch & Co. and himself, and that this sum would tide the company over its present needs of capital and would be able to maintain production.

The Enger Motor Car Co., Cincinnati, O., has been sold to William Magly for \$70,000. In addition to this amount the receiver has \$88,129.87 on hand.

The Dale Body Co., Fostoria, O., which will manufacture motor car bodies for the Allen Motor Car Co., has started work on its plant, which will be of modern fireproof construction. The plant will have 30,000 square feet of floor space and will have a daily capacity of 100 bodies.

The Hewitt Rubber Co., Buffalo, N. Y., has increased its capital from \$1,000,000 to \$1,500,000. The company will engage in the manufacture of automobile tires, which department will be in charge of J. H. Kelly, formerly of the Republic Rubber Co.



Factory of the Elgin Motor Car Corporation, 61st Street and Archer Avenue, Chicago, Ill., Showing Cars Emerging from the Testing Floor Under Tents, Used Temporarily While Building Operations Proceed.

SLADDEN NEW TYPE TIRE VALVE

Radical Innovations in Device Creating Much Interest Among Makers and Users

What is apparently the first successful change in the type of tire valve generally employed will soon come into general use if the innovations announced by Sidney C. Sladden are generally accepted, and, it is understood, that his claims have been approved by a number of tire makers who inspected his new device.

Several points of superiority are claimed for the valve, principally that of simplicity, and this is a very important one, as it makes possible the manufacture of the valves in large quantities, enabling the producers to market it at a very low price.

Another important feature is that it can be screwed in the standard valve stem so that in the event of possible trouble a user may replace it with one of the old type of mechanism should no

other be readily available at the time.

Principally the Sladden valve, according to preliminary announcements, consists of a small sleeve, which screws into the valve stem and carries a brass plunger with a broad rubber head, all fitting in an annular chamber, which is counter bored inside the stem. The chamber contains a small coiled spring, which presses the rubber head against the end of the sleeve. The head covers both the sleeve and the joint between the sleeve and the stem. A complete seal is thus effected, which becomes more securely fixed with the increased pressure in the tire. The cap is similar to that at present in use, being reversible and having a rubber disc inside to effect an additional seal and a deflating pin at the other end.

CONVENTION OF BUICK DEALERS IN FLINT, MICH.

Over 4000 Buick dealers were represented at the annual meeting of the managers and distributors of 36 branches of the Buick Motor Co. from all over the United States, held at Flint, Mich., this week. Walter P. Chrysler, president and general manager of the Buick Co.; H. H. Basset, assistant general manager, and E. T. Strong, sales manager, were the principal speakers at the several gatherings. The 1918 models were on exhibition.

LINCOLN HIGHWAY FROM TRENTON TO PHILADELPHIA.

In the annual touring number of the Automobile Journal the routing of the Lincoln Highway was given on the section between Trenton, N. J., and Philadelphia, Pa., as being along the course of the Delaware river on the New Jersey side. The new official routing of the highway from Trenton takes the tourist across the river to the Pennsylvania side and through Philadelphia to Coatesville and is as follows:

Trenton, Oxford Valley, Glen Lake, Langhorne, Bustleton, following the Bustleton Pike to Rhawn street, Philadelphia, turning left on Rhawn street to the northeast boulevard, about the distance of a city block, turning right on the northeast boulevard continuing to the end of the boulevard at North Broad street take left hand turn on North Broad street direct to City Hall, circle City Hall on the right to South Broad street as far as Walnut street, turning to the right on Walnut street to dead end at 63d street (entering Philadelphia from the west on 63d street, Chestnut street, one block north of Walnut street, is used instead of Walnut street to Broad street, this is on

account of the streets being restricted to one-way traffic), turning to the right on 63d street, continuing on 63d street to Lancaster avenue, turning left on Lancaster avenue to city line, at which point the continuation of Lancaster avenue becomes known as Lancaster Pike, follow Lancaster Pike to Ardmore, Bryn Mawr, Berwyn, Paoli, Whitford, Downingtown, Thorndale station, Coatesville.

FISHER BODY CORP. EARNINGS.

The Fisher Body Corp. and its subsidiary company, report net earnings of \$2,876,407 for 8 1/3 months. After all of the expenses and interest has been deducted the net income is \$2,779,887, equal to \$9.50 on a share of the common stock. This net income is over eight times the preferred stock dividend for the period.

HOME AND EXPORT TRACTORS.

The Monarch Tractor Co. of Watertown, Wis., report that enough orders have been booked to keep their plant busy for several months. They have made contracts for materials for at least 400 tractors which they expect to manufacture before the first of next year. Besides the domestic business this company reports that 65 tractors have been consigned to Russia this week. Supplementary to the original line of 30-20 horsepower work has been started on a line of 20-12 horsepower and 10-6 horsepower tractors.

WOMEN IN AUTOMOBILE SHOPS.

The effect of military service is beginning to show in the automobile industry, where the employment of women in places that have always been filled by men is steadily increasing. The Nash

Motors Co. of Kenosha, Wis., has placed a number of women in its core room. The Cutler-Hammer Mfg. Co. and the Geuder, Paeschke & Frey Co., both of Milwaukee, Wis., together with a number of other allied concerns, are not only beginning to fill men's places with women, but are advertising for women for shop work.

NATIONAL CASH REGISTER HOLDING BIG SALES CONTEST.

The distributors of National Cash Registers throughout the United States are participating in a National sales contest which is being conducted by the National Cash Register Co., Dayton, O. Many of the salesmen in the company's employ have established new sales records so far and particularly on the National Cash Register credit file which is being adopted by thousands of merchants and business men as a means of simplifying their accounting systems.

DURANT HELPS JERSEY FARMERS.

W. C. Durant, president of the General Motors Co., has donated the services of a farm cultivating crew and outfit to the farmers of New Jersey. The outfit consists of two motor trucks, one loaded with farm implements and the other carrying a farm tractor. When a farmer is found who requires assistance in getting his fields cultivated and planted, the tractor is unloaded, the field selected and plowed. Then the crew of farmers which travel with the outfit set to work and finish the job, remaining until all the work necessary is completed.

In sending out the crew Mr. Durant told the men to go anywhere that they could help the farmer. He said: "I don't care where you go, but I want you to do service to farmers who really need it."

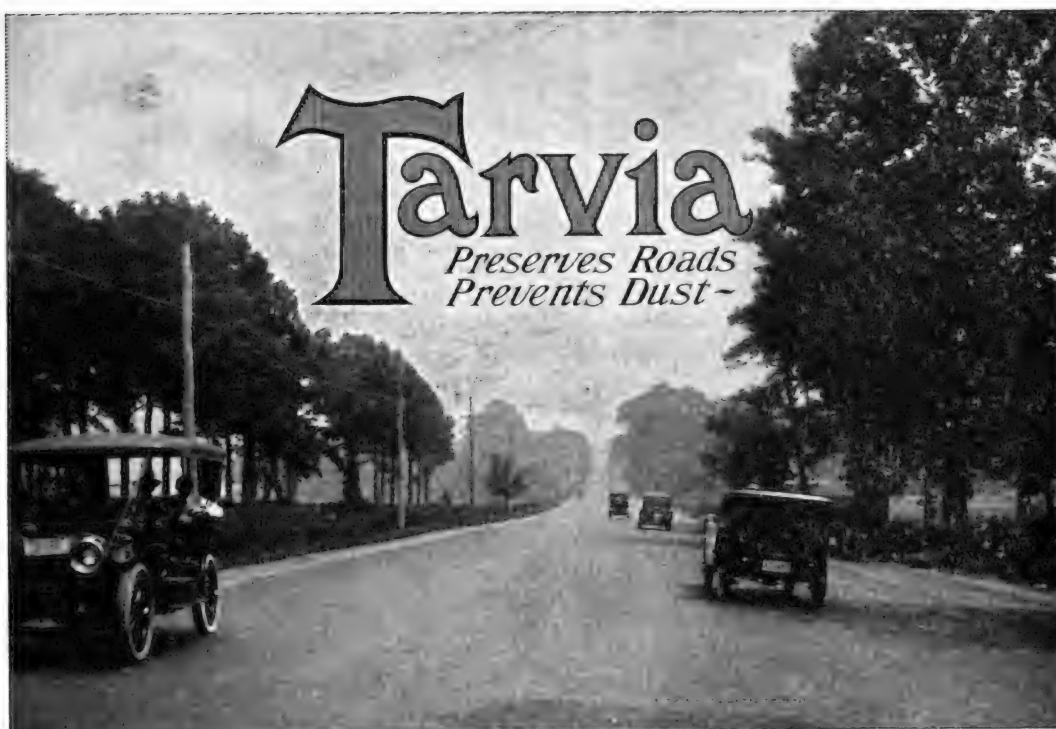
The project is a personal one with Mr. Durant, he having conceived the idea and selected the equipment. He went to New York and purchased two GMC trucks, paying for them as any ordinary patron would. Then he bought the tractor and the farm machinery and started the outfit on the road.

MARMON TO MANUFACTURE AIRPLANE MOTORS.

The Nordyke & Marmon Co., recently formed in Indianapolis, Ind., for the manufacture of airplane motors, signed a contract for the construction of a one-story factory building, 100 by 350 feet. The motors will be made for the United States government.

CANADIAN \$1,000,000 ORDER.

An automobile dealer at Lethbridge, Alberta, has ordered \$1,000,000 worth of automobiles for the southern Alberta trade according to a report from Canadian Pacific officials. That territory has had two immense crops and a record yield is expected again this year.



Eastern Parkway, Borough of Bronx, New York City.
Treated with "Tarvia-B" in 1916.

Going Fast—But No Dust

ALL day long the automobiles go whirling through this street and there is no dust—the air is clear and clean, the foliage stays fresh.

This means that the road is rightly constructed; that it is strong enough to withstand the traffic on its surface.

For clouds of dust following an automobile mean that the road is "wasting away."

So also is the taxpayers' money that paid for the road originally and will soon have to pay for its reconstruction.

Dusty roads are absolutely unnecessary. The photograph above illustrates that.

Build and maintain your roads with Tarvia and instead of being *weaker* they will be *stronger* than the traffic which passes over them.

Tarvia is a coal-tar preparation which reinforces the road-surface and makes it waterproof, dustless and mudless.

Strange to say, it does not add to the cost to make a road dustless and durable with Tarvia, because the use of the Tarvia reduces the annual up-keep expense to such an extent that it *more than pays for the cost of the treatment.*

Many cities and towns have adopted the use of Tarvia on a large scale simply to reduce their annual road bills.

If you are interested in the road proposition, write us and we will send you a booklet showing towns all over the country that have used Tarvia successfully and economically.

Special Service Department

This company has a corps of trained engineers and chemists who have given years of study to modern road problems.

The advice of these men may be had for the

asking by any one interested.

If you will write to the nearest office regarding road problems and conditions in your vicinity, the matter will have prompt attention.

The *Barrett* Company

New York Chicago Philadelphia Boston St. Louis Cleveland Cincinnati Pittsburgh
Detroit Birmingham Kansas City Minneapolis Nashville Salt Lake City Seattle Peoria
THE PATERSON MANUFACTURING COMPANY, Limited: Montreal Toronto Winnipeg
Vancouver St. John, N. B. Halifax, N. S. Sydney, N. S.



FREE TOURING MAPS



CHECK MAPS DESIRED
AND MAIL TO
GULF REFINING COMPANY
DEPT. 1370 PITTSBURGH, PA.

<input type="checkbox"/> Middle West	<input type="checkbox"/> Pittsburgh-Buffalo
<input type="checkbox"/> Transcontinental	<input type="checkbox"/> Southern States
<input type="checkbox"/> New England	<input type="checkbox"/> Pennsylvania
<input type="checkbox"/> New Jersey	<input type="checkbox"/> Texas

NAME.....
CITY..... STATE.....

NEW DEPARTURE BALL BEARINGS



American Made
FOR
American Trade
QUALITY
FIRST

THE NEW DEPARTURE
MANUFACTURING CO.
CONRAD PATENTS LICENSEES
BRISTOL, CONN., U.S.A.



F-F BATTERY BOOSTER

MAGNETIC
RECTIFIER
Patented
April 1916



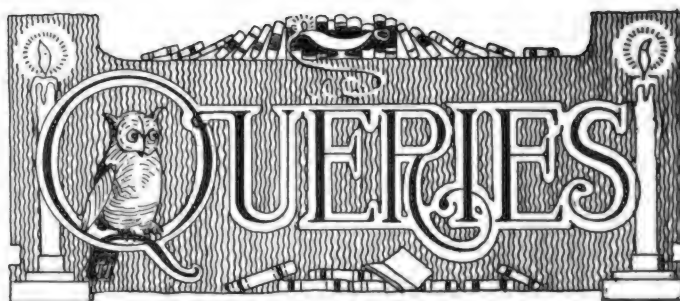
Keep your storage battery fully charged if you'd get the most out of it in service and length of life.

Plug into any convenient 110 volt 60 cycle alternating current lamp socket and connect the charging leads to the battery terminals. Leave battery right in car with all connections intact.

Ten cents worth of current over night insures a Positive Start, more Power and Brilliant Lights.

\$15 Complete.
Effective July 1st, \$18
F. O. B. Cleveland
Get Bulletin No. 15

THE FRANCE MANUFACTURING CO., Cleveland, Ohio.
Jobbers and Dealers Throughout the United States and Canada.



NOTICE TO READERS.

THIS department contains the Mechanical Editor's answers to readers' inquiries. It is open to every subscriber. If any part of your car is not operating satisfactorily, or if you desire information regarding operating, maintaining or repairing motor cars, do not hesitate to lay your troubles before him. He will answer promptly and fully, either by mail or in these columns, as you direct. This service is free to every subscriber, and is often the means of saving considerable money that otherwise would be spent with a garage man. Letters should always be signed with the writer's full name and address, and the car or part in question should be properly identified, by mentioning the maker's name, model, year of production or other distinguishing feature. Address all inquiries to the Mechanical Editor.

THE AUTOMOBILE JOURNAL IDEA EXCHANGE.

For the benefit of readers of the Queries column it has been decided to conduct in this department a more widespread interchange of ideas. To this end the attention of readers is invited to the following question:

HOW DO YOU ADJUST THE BRAKES ON YOUR CAR AND WHAT ATTENTION DO YOU GIVE THEM?

To the writer of the best answer to the above question \$2.50 will be paid. The best answer received will be published in the second issue after the appearance of the question in the magazine. Answers to the question should be in the hands of the editors by the 18th of July. The contest is open to every subscriber.

MASTER CARBURETOR QUERY.

(G. B., Providence, R. I.)

I have a Master carburetor which I would like to attach to my Ford car, but as the flange is on top of the carburetor it will not connect with the Ford manifold unless I put the carburetor on its side. Where can I get a fitting for adapting this carburetor to the car?

The Master carburetor as furnished by the Master Carburetor Corporation at Detroit, Mich., for application to the Ford car, is fitted with a special intake manifold. It is possible that you could obtain a fitting from them that you can use for an adapter and we would suggest that you write direct to them, giving them the dimension of the carburetor, etc. Many automobile supply houses and garages carry such fittings in stock.

REMOVING WHEELS FROM SCRIPPS-BOOTH CAR.

(C. F. P., Baltimore, Md.)

Will you please tell me how to remove the Houk wire wheels from my Scripps-Booth 1916 car? The gears which are on the wheel shafts do not mesh with the little gears in the differential by 3/16 of an inch. Is there any adjustment to make them mesh more closely? There seems to be a rattle between the transmission gearset and rear axle, when the car is being started, and in changing gears. Would it be caused by the lost motion in the differential?

The wheels are removed as follows: Jack up the car until the wheel is free from the ground, being sure that the jack has a firm foundation. Next examine the hub and find on the side of the hex nut the word "on," with arrows indicating which way to turn, as both right and left hand threads are used. With the wrench turn the nut in the proper direction.

(When Writing to Advertisers, Please Mention The Automobile Journal.)

This cannot be turned unless the wrench is slipped well over the nut to push down the ratchet catch, which is arranged on one face of the nut. On removing this nut the wheel may be slipped off. On the earlier 16 models it is also necessary to remove the nuts on the wheel studs which project through the flange of the wheel.

There is no adjustment for the differential gears, so would advise you to insert either a thin brass or bronze washer over the gear hub, between the gear and the differential housing. This will cause the gears to fit more closely together.

The rattle you complain of may be due to the lost motion in the differential. It is more probable that the universal joint is worn or loose on the shafts. It is an easy matter for you to locate the faulty member, however. When you remove the differential throw the high speed gear and clutch in, and, by reaching in the differential housing, you can determine the lost play by turning the pinion gear back and forth.

ADJUSTING SCHEBLER MODEL L CARBURETOR.

(A. E. H., Lowell, Mass.)

Will you please give me complete instructions for setting and adjusting the Schebler model L carburetor on my Regal car?

The Schebler model L carburetor is adjusted as follows: First, adjust the auxiliary air valve A so that the valve is seated lightly, but not too firmly; then close the needle valve B by turning it to the right until it seats, being careful not to seat it too tightly or it will be damaged. Then turn it back (to the left) four complete turns and prime the carburetor by pulling up the priming lever C and holding it for four or

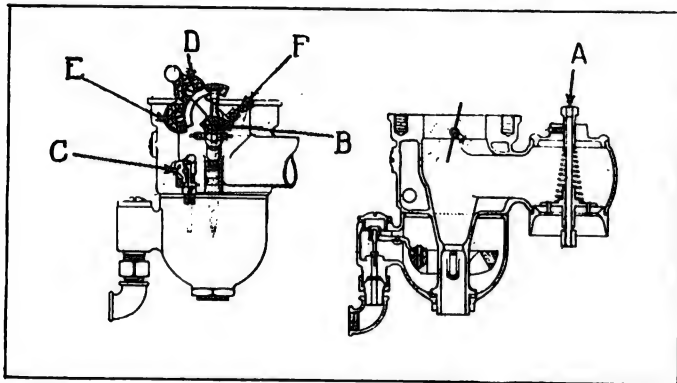


Diagram and Cross Section of Schebler Model L Carburetor. A, Auxiliary Air Valve; B, Needle Valve; C, Priming Lever; D, Intermediate Speed Adjustment; E, High Speed Adjustment; F, Throttle Stop.

five seconds. Next open the throttle about one-third and start the engine. After the engine has been run a few minutes close the throttle and adjust the throttle lever screw F so that the throttle cannot be closed sufficiently to stop the engine. Open or close the valve B until the engine fires on all cylinders when throttled down to its lowest. This adjustment should not be altered after it has once been adjusted.

The intermediate and high speed adjustments are made on the dials D and E as follows: Adjust the pointer on the dial D about half way between the figures one and two, and with the engine running advance the spark and open the throttle so that the roller on the track running below the dials is on a line with the dial D. If the engine backfires with the throttle in this position turn the indicator toward figure two or three until it runs smoothly. If it does not back fire turn it back toward one until it does, then toward two until it does not. By this procedure just enough gas is admitted to allow it to run smoothly.

The high speed adjustment is to be made on dial E in the same manner that the intermediate adjustment was made on dial D.

The amateur is very apt to give too rich a mixture, which results in a loss of power. In adjusting the needle valve B, as well as making the adjustments on dials D and E, the gasoline should be cut off until the engine back fires, then the adjustments advanced very slowly until it does not back fire.

(When Writing to Advertisers, Please Mention The Automobile Journal.)

Friction starts Grinding before Grease begins Lubricating

Common grease needs heat to soften it before it can lubricate. The parts grinding together must furnish this heat in the shape of friction. Meanwhile these parts get no lubrication. And Friction—getting a good start—is never caught up with by grease.



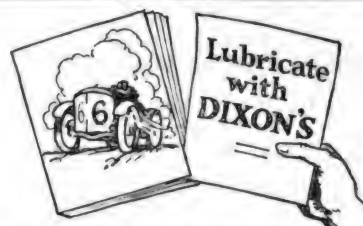
Lubricates Instantly—and Always

NON-FLUID OIL lubricates the second your car moves from rest—and every minute it is in motion. Doesn't give friction a chance to start. It never melts, never leaks out, is much purer and longer lasting than any grease you can buy.

If you buy lubricants on the same basis that you buy tires—purely on service, you'll ask for NON-FLUID OIL every time. Get "K-oo Special" grade for gears; "K-ooo" grade for bearings. Sold at your dealers in orange-colored cans only.

Write for a free booklet, "Lubrication of the Motor Car."

New York & New Jersey Lubricant Company
65 Broadway New York City



Take a Leaf From the Racers' Book

Once more a Dixon-lubricated car has demonstrated Dixon dependability. Earl Cooper, winner of the 250-mile Chicago Speedway Derby, says: "Dixon's Graphite Automobile Lubricants are about as necessary to a racing car as gasoline."

DIXON'S
GRAPHITE
Automobile
LUBRICANTS

have won the following firsts this year:

Driver	Car	Track	Date
Billy Taylor	Newman Special	Uniontown, Pa.	May 10
Louis Chevrolet	Frontenac	Cincinnati	May 30
J. P. Fetterman	Peerless	Uniontown, Pa.	May 30
Dave Koetzle		Detroit (dirt track)	May 30
Earl Cooper	Stutz	Chicago	June 16

Not only have Dixon's been used in the winning cars, but nearly every car that finished inside the money was kept friction-free by Dixon's. Here's a good bunch to the everyday driver of pleasure or commercial cars. Dixon's prevents that metal-to-metal contact which makes friction, and friction spells ruin to your car.

Write Department 210-G for the Dixon Lubricating Chart.

JOSEPH DIXON CRUCIBLE COMPANY
JERSEY CITY, N. J.

Established 1827

EMCO Automobile OIL

The world's best petroleum refined by the most scientific method in the world's largest independent refinery.

Sold by dealers generally, or shipped anywhere by the refinery under a Money-back guarantee.

Prices and Samples on Request.



EMERY
MANUFACTURING CO.
Bradford, Pa.

Supreme Upholstery

When a dealer or manufacturer sells you a car upholstered in Du Pont Fabrikoid, Motor Quality, he sells you something infinitely superior to the average so-called "genuine leather" or coated "splits." He gives you a standard material—standard in quality, service, appearance and wear. A scientifically constructed leather-like fabric twice as strong as coated "splits."



MOTOR QUALITY

has all the artistic beauty and looks of the finest leather with none of leather's faults. It is water, dust, grease and stain proof and sincerely guaranteed.

It comes in standard rolls and standard widths. It saves the car manufacturer time, labor and expense because it can be cut in multiples and eliminates waste. It guarantees each car purchaser better satisfaction because it gives greater service.

Write for samples and booklet.

DuPont Fabrikoid Co.,

Wilmington, Del.

Works at Newburgh, N. Y. and
Fairfield, Conn.

Canadian Office and Factory, Toronto

World's Largest Makers
of Leather Substitutes



STUDEBAKER SIX WIRING DIAGRAM.

(C. H., Lakehurst, N. J.)

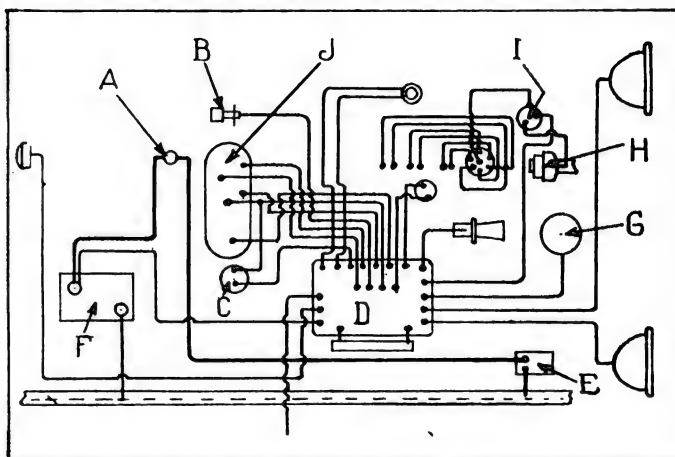
Will you kindly tell me why the double switch (ignition) is used on the Studebaker Series 17, six-cylinder car? How is it connected? Will you please give me the correct adjustment of the carburetor on this car? I am using Bon Ami on the upper part of the headlights, is this correct to obtain the benefit of most light or should it be on the bottom?

We print herewith a wiring diagram of the series 17 Studebaker Six car and you will note that the wire from the ignition switch is connected through the junction block to the ignition coil. Both terminals of the two-way switch are connected with the same wire, so that it makes no difference which side the switch is on.

To adjust the carburetor on the car proceed as follows: Retard both the spark and throttle and turn the auxiliary air valve (the large adjusting nut) to the right or as far down as possible, then turn back, or to the left, one and one-half turns. Now turn the high speed adjustment (located directly beneath the auxiliary air valve adjusting nut) to the right, or as far up as it will go; leaving it in this position, start the engine.

Now turn the auxiliary air adjustment either to the right or left (generally to the left) until the engine fires perfectly on all cylinders. This will give the correct low throttle adjustment.

Leaving the spark retarded, turn the high speed adjustment to the left, or down, by half turns. After each half turn



Studebaker Wiring Diagram. A, Starting Switch; B, Speedometer Lamp; C, Ammeter; D, Junction Block; E, Starter; F, Battery; G, Generator; H, Distributor; I, Coil; J, Lighting Switch.

quickly accelerate the engine and note whether same back fires. Continue turning down the high speed adjustment by half turns until the engine does back fire on quick acceleration, then turn to the right or up until the back firing stops under same conditions.

Now advance the spark half way on sector and note whether the engine back fires on acceleration. If not, carburetor adjustment is properly set, and there should be few occasions to make changes on same.

The glass in the upper half of the headlight should be dimmed by Bon Ami.

REAR AXLE TROUBLE, HUDSON 1912 FOUR-CYLINDER.

(F. W. B., Needham Heights, Mass.)

I have a Hudson 1912 four-cylinder car. There is an excessive amount of oil thrown to the brake bands from the rear axle. I find that I cannot get to the felt washer in the rear axle by removing the wheels or turning the spider shaped nut which is inside the differential housing. No matter which way I turn it, it runs to the end and then stops. How can I remedy the oil trouble?

The engine skips when it is running at about 15 miles per hour, but runs all right when speeded to 25 miles per hour. What is the trouble?

The felt washer of which you speak, that its located on the

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outside of the differential, in the rear axle, between the differential and the wheel, was put into place before the axle was assembled. It can only be removed or replaced by taking off the rear axle housing or disassembling the axle.

To prevent the excess oil leakage to the brake bands you have your choice of three methods. Try them in the following order:

First—Between the wheel and the sleeve upon which the roller bearing is mounted, fit a felt washer. When the wheel is in place it will press the washer against the sleeve, preventing the escape of oil from the housing.

Second—If above remedy is not sufficient, disassemble the rear axle, replace the original felt washer and reassemble the axle, taking care to have all parts in their relative positions. Before taking to pieces make a mental picture of all parts and their relationship to each other.

Third—A method which is used in extreme cases, where felt washers fail, is as follows: Bore a $\frac{1}{8}$ inch hole in the axle housing, near to the roller bearing, in such a way as to permit the oil to run from the axle to the ground. This method should not be adopted until the other two have been tried and failed.

The nut in the differential housing which you have been turning back and forth, is the adjustment for setting the ring gear and driving pinion to their correct relationship. There is such an adjustment on each side of the differential. These should be set in such a manner as to prevent side play of the differential, and so that the pinion and master gear mesh correctly. When correctly meshed the faces of these two gears correspond. The teeth should not be meshed to such a depth that the teeth of one gear ride against the other gear and cause a grind. In a new set of gears there is no backlash, or grind, when they are in their correct positions.

You may find that it is necessary to replace the gears. While the rear axle is disassembled is a good time to do so. If you find that the teeth are worn thin, or to a point, or that they cannot be set to run smoothly without grinding—they should be replaced.

The engine skip may be due to a number of reasons. Passing over the ignition system, as you write that you have fully covered it, compression leakage, due to improperly fitting rings, scored or worn cylinders or badly worn valves is the first thing for which to look. You can easily determine the amount of compression by cranking with the hand crank and making general comparison with each of the cylinders.

Valve stems that are a loose fit in the guides, permitting an excess of air, are a frequent cause of skipping. The same trouble is often due to a poorly fitting manifold. In replacing an intake manifold, new gaskets should always be used. A thick paste of graphite and oil makes a good sealing compound. The gasket between the carburetor and manifold should be examined.

A wrongly adjusted carburetor may give the same result.

The Stromberg type A carburetor is adjusted as follows: Open the high speed adjustment until there is a clearance between the spring and the valve (this is the adjustment on the top spring over the air valve). Then shut the low speed (adjustment under air valve) until the valve seats. Then turn it back three full turns. The high speed adjustment should be made so that there is $\frac{1}{32}$ inch clearance between spring and adjustment. Start the engine and when it is running at normal adjust the high speed adjustment so that it does not backfire or skip.

FORD MAGNETO TROUBLE.

(M. S., Chicago, Ill.)

I have been having quite a little trouble with my Ford magneto. For a long time it has been furnishing but very little current and now it has stopped altogether. I have connected a wire with the magneto plug and had the engine turned over briskly. Upon touching the base of the engine with this wire no spark is made, as formerly. Can it be that the magnets are entirely demagnetized? Where can I connect a set of batteries and how many shall I use?

It is unlikely that the magnets are so fully demagnetized as to prevent the generation of current. It would seem that dirt or waste has accumulated beneath the magneto brush and

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32x3½	9.50	3.10	36x4½	14.00	5.00
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prevents the passage of current from the magneto coils to the brush. Remove the brush by unscrewing the three little screws that hold it in place. See that it is clean and that it makes contact with the little brass plate on the coil assembly.

It is possible that the wire ribbon which is wound upon the magnets is broken or grounded at some point, and, if this is the case, it will be the most economical for you to replace the coil assembly.

If you desire to use batteries for ignition, obtain six cells and connect them in series (carbon to zinc); one of the terminals (zinc) should be connected with the terminal on the inside of the dash that corresponds with the terminal which is at present connected with the magneto; the other should be connected with the engine base, as near the timer as possible. When batteries are used the switch bar is placed to the "right" position when it is desired to start the engine.

SETTING ATWATER KENT UNISPARKER.

(J. T., Philadelphia, Pa.)

Will you kindly give me directions for adjusting and timing the Atwater Kent breaker box on my King model E car?

The first adjustment necessary is the size of the gap between the spring and adjusting screw in the breaker box. The distance between the points should not be less than .012, or they will pit and stick. This adjustment is made by adding or removing the little washers, as shown at A, until the points are the right distance from each other. As the cam is turned the points will be brought together when the top of

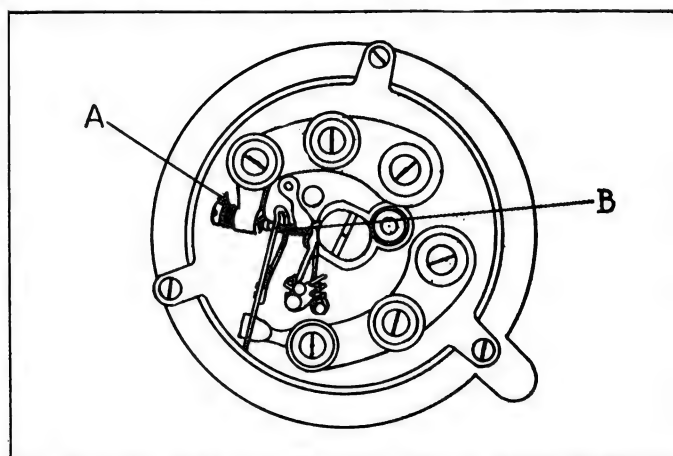


Diagram of Atwater Kent Unisparker Breaker Box.

the cam is reached, breaking apart as the cam is turned still further.

Next turn the engine with the hand crank until the piston in number one cylinder (front cylinder of right hand block) is at the extreme top of its stroke between the compression and power strokes. Disconnect the spark control rod from the side of the distributor and loosen the set screw on the vertical part of the housing underneath. Next turn the distributor slowly backwards, in the opposite direction to normal rotation, until a click is heard. Without moving the unisparker, tighten up the set screw; then advance the spark lever on the steering wheel about one-half inch up on the sector, and connect the spark control rod with the distributor case in such a manner that there will be no play.

DIFFICULTY IN STARTING FORD CAR.

(T. K., Boston, Mass.)

I find great difficulty in starting my Ford car in the morning for the first time, though it seems to start all right after it has warmed up. I have just had new ignition wiring installed, so that I am sure that this installation is all right. Can you help me in any way?

There are a number of reasons for difficulty of this sort in starting a Ford car engine. The first is the result of a low fuel level in the carburetor float chamber. The fuel level should be about 1/16 of an inch below the needle valve, or just

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low enough so that the fuel does not flow through the needle valve when the engine is stopped.

All of the gaskets on the intake manifold should make tight joints. Every time the manifold is removed and replaced new gaskets should be used. In putting the gaskets in place it is well to thoroughly cover them with a mixture of graphite and oil so that the air cannot leak by them. The same statement applies to the gasket between the manifold and the carburetor.

As you say that the ignition system is practically new, we will not go into it except to say that the distance between the spark plug points should be about the thickness of a 10-cent piece.

COMPRESSION LEAKAGE.

(T. K., Boston, Mass.)

My Ford car engine seems to lack compression of late and there is a hissing noise while the engine is being run. On my return from a long run yesterday I removed the transmission cover and a cloud of smoke poured from the case. Do you think that the trouble is due to compression leakage past the pistons?

You can easily find out whether there is much leakage in the cylinders by trying the compression by cranking the engine. Loss of compression may be due to either or all of the following three reasons:

Scored cylinders.

Worn or out of round cylinders.

Piston rings improperly put in place.

The first remedy that we would advise you to try is the graphite remedy. While the engine is being run at about normal speed, slowly pour about a teaspoonful of Dixon's motor graphite into the carburetor air intake. The manufacturers claim that such a procedure is often effective in the filling of scores in cylinder walls. If the walls are badly scored or

worn out of round by long usage, you may find that reboring or regrinding is necessary. This operation can only be performed by an expert mechanic or repair man.

It is possible that when the new rings were put into place you did not adjust or fit them properly. The diagonal slot should nearly come together when the piston is in place. The slots in the three rings should not be on the same side of the piston; the slot in the second ring from the top should be on the opposite side from the top one; the next or last ring should be the same as the top one.

The installation of a set of the so-called "leak proof" or "compression proof" rings may solve your trouble. The reason for the smoke in the transmission is that the gas escaped from the explosion chamber past the pistons into the engine base and from thence into the transmission case.

LOOSE TORQUE ARM.

(G. H. F., Glen Ridge, N. J.)

Will you please tell me how I can keep the torque arm on my Packard car from working loose? I am obliged to tighten it on an average of once a week, as it will not stay tight.

Where can I have tires retreaded?


The bolts in the arm should not work loose if they are fitted with lock washers and the nuts held into place by cotter pins. If the bolts show very much wear, as is probably the case, replace them with new ones of sufficient length to allow the placing of a lock washer on each. When the nuts are tightly into place (nuts should be castellated) slip a cotter pin into a hole that is bored in the bolt, thus locking the nut firmly into place.

Practically all of the tire manufacturers are equipped to retread tires. We would advise you to take your tires to a reliable service station, where they will advise you as to whether it is practical to have the tire retreaded and to whom to send it.

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EXCESSIVE OIL LEAKAGE.

(J. A. M., Lansford, N. D.)

I have a 4-14 car and no matter what kind of oil I use the engine requires about one gallon of cylinder oil for every 100 miles. I have put in leak proof rings and bored the pistons as directed in one of your articles, and though the combustion chamber and spark plugs are apparently free from excess carbon, the leakage of oil continues. What would you advise me to do?

We assume from your letter that you are having no trouble with oil leakage into the cylinders or combustion chambers and that there is therefore no excess smoke emitted from the exhaust.

There is but one point left where the oil could be dissipated, namely, through the joint between the base and top of engine. This leakage would not be noticeable while the car was standing, but as soon as the engine is started the splash of oil might cause leakage through the joints. We would suggest that you remove the oil base and put in a new gasket.

If the exhaust seems black or to contain burned oil gases, it is an indication that there is still leakage through the cylinders. Is this the case?

Are you sure that the oil level is not too high? There should be just enough oil in the base to run through the upper drain cock. Be sure that this drain cock is kept closed. We have heard of cases where this cock was inadvertently left open and as soon as the engine was started much of the oil was forced through it.

KNOCK IN ELCAR 1917 ENGINE.

(H. H., Jr., Winooski, Vt.)

I have been greatly bothered lately by a knock in the engine of my Elcar 1917 model car. The knock is similar to that caused by preignition or a spark advanced too far, though it occurs at all positions of the spark lever, whether retarded or not. The knock seems to cease when the auxiliary air intake of the carburetor is choked. Do you think the trouble is in the carburetor?

We doubt that the trouble is in the carburetor. This carburetor was adjusted at the factory and aside from the float adjustment there is no other possible change that can be made.

There are two probable causes, preignition caused by carbon deposit in the cylinders, and preignition resulting from a too advanced timer distributor position. We are inclined to think that the latter is the case.

It is an easy matter for you to find whether there is any carbon deposit in the cylinders, by removing the spark plugs and scraping the pistons with the finger nail. It takes but little carbon in the cylinders to cause preignition. After you have used the car for an hour or so, put about two tablespoonfuls of kerosene into each cylinder and let it stand all night. In the morning a greater part of the carbon will be blown through the exhaust. If the deposit is excessive it may take two applications to remove it. It may be necessary to scrape it from the pistons after the cylinder heads have been removed.

Find the top of the piston stroke in either of the cylinders, then turn the engine until the piston has traveled on the down stroke from $\frac{1}{8}$ to $\frac{1}{4}$ of an inch. At this point, with the spark lever set at fully retarded position, the points in the breaker box should just be separating. If this is not the case the distributor unit should be retarded upon the shaft so that the points will separate at about $\frac{1}{8}$ or $\frac{1}{4}$ inch after piston has passed top of stroke.

IDEA EXCHANGE.

Have you sent in an answer to the question that appears at the head of the Queries Column? Be sure to answer it fully and clearly. Every motorist has had instructive experience with brakes that might prove of value to other readers if they but knew of it. If your reply is published you get \$2.50 and it costs you nothing.

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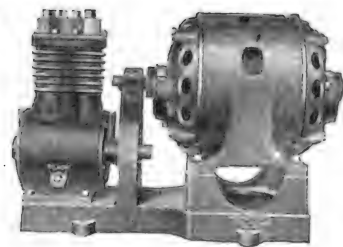
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JULY 25, 1917.

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Treasurer . . WILLIAM H. BLACK
Secretary D. O. BLACK, JR.

Published the 10th and 25th of each month by the

AUTOMOBILE JOURNAL PUB. CO.
Times Building, Pawtucket, R. I.

THE announcement of a special Used Car Number, which is to be published Sept. 10 in combination with the September issue of the Accessory and Garage Journal, is of exceptional interest to motorists of all classes at this time. In the face of the unusual conditions which have arisen by the war's demands, the extraordinary popularity of the motor vehicle remains unabated. People who never gave the matter a thought before this summer now desire a motor car. Never ceasing improvements and refinements are far from being the sole explanation of this demand. The public has a well founded idea that good values are placed in the cars which have been built for the past several years. And the public is right. In these two special issues the Used Car subject will be treated from various points of view. The information will be arranged on mechanical, individual and practical lines. There will be something in the way of legal observations and hard-headed, common sense business considerations. All will be copiously illustrated. No other magazine has essayed to strike at the set price obstruction, the drag on car marketing today, with energy, courage and vim. Set prices, demeaning under valuations, are not to be tolerated by owners, dealers or manufacturers.

THE motorists' idea exchange in the Automobile Journal is featured this issue by announcement of the reward of merit on the subject of care of tires. Several letters vied with the one that received the award in excellence, save in the attention to detail which marked the one which secured the editorial decision. These are practical questions and they mean practical helps to fellow motorists. Every motorist knows something valuable about the question asked this time. Pass the information along.

NEW owners of new and used cars taking much interest in the series of special articles dealing with mechanical construction and explicit instructions on how to give a minute examination to a car. The subject of this particularly valuable article in this issue of the magazine is "The Restoration of the Ford Car." From the beginning of time humans have been filled with a passion for taking things apart and putting them together again. A boy will do it with his father's watch if he gets half a chance. In this age of the motor vehicle this passion for taking things apart serves a most useful purpose. It spreads knowledge and, in the case of disassembling an automobile, it furnishes the one exact means of determining just what to do with a car as soon as it becomes one's own property. In order to get the most out of a car it is obvious that it needs to be made strong where it is worn or weak. With the full instructions given one need not be a master craftsman in order to take his machine apart and put it together again. Follow directions, tag the parts carefully, make notes. These are some of the basic principles—but it would be well to read the pages which gives the details.

THE season of makers' announcements of new models has arrived, so in this and following issues there will be found trade and mechanical descriptions of the newest offerings in passenger cars. The average motorist is interested in all the new developments and he naturally turns to this magazine, where they will be found, for them. No motorist is so bound up in his own car alone but takes the time to keep pace with the refinements put out by the makers in general. Notwithstanding the war, some interesting announcements are coming in the editorial and advertising pages of this journal.

The Dominant One-Ton Truck Unit



Announcing

The Dearborn Universal One-Ton Truck Unit for All Cars

A bigger, more profitable money maker for dealers.

A One-Ton Truck Unit that fits *all* cars and made by a strong company, whose success in building Truck Units has been demonstrated nationally.

With the new Dearborn Universal Truck Units you can profitably solve the Used-Car problem in your locality. Convert these cars into trucks. For cars with larger horsepower use the *new* Dearborn Universal Two-Ton Truck Unit.

\$350
and up

One or Two-Ton
DEARBORN
Truck Unit

\$350
and up

All Dearborn Truck Units are designed so that 90% of the load is carried on their heavy Dearborn Rear Axles, Heavy Springs and Heavy Pruden artillery type Rear Wheels, with guaranteed hickory spokes and felloes.

Bock Heavy Duty Roller Bearings, Baldwin Roller Chains, Baldwin Steel Sprockets, Jack-Shaft Hangers and Back-Rod Hangers HOT riveted to frame—not *merely* bolted.

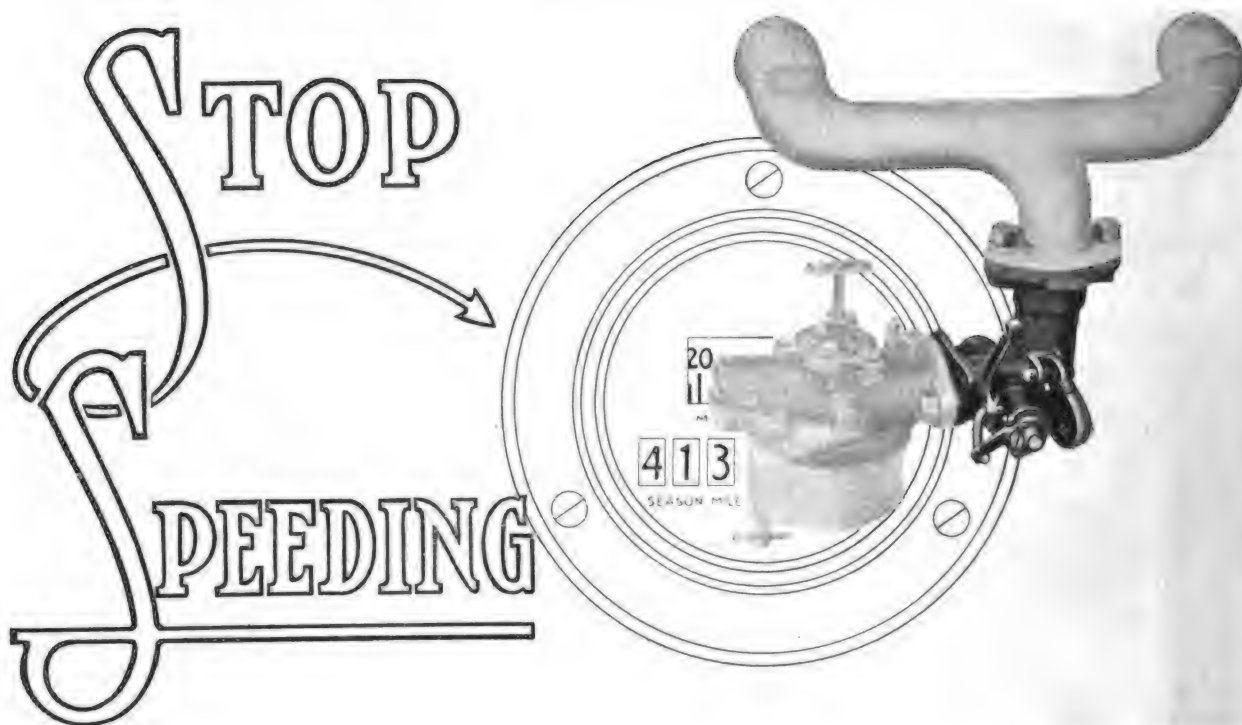
Wire or write for Dealer's Big Money Making Proposition.

Dearborn Truck Co.
1262-74 S. Campbell Avenue
Chicago

A MONEY MAKER

(When Writing to Advertisers, Please Mention The Automobile Journal.)

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Every Ford delivery car needs a Monarch Speed Governor. Drivers can be hired and fired, but the speed abuse goes on just the same. To effectively check this common abuse—to stop the enormous waste in repairs, tires and gasoline, it must be done automatically. Depending upon human judgment only helps occasionally. Thousands of accidents to other vehicles and to people which occur daily could be avoided if fast driving were made impossible.

\$25.

COMPLETE, READY TO INSTALL.
NO HOLES TO DRILL—
NO MECHANICAL CHANGES.

**MONARCH
SPEED GOVERNOR**
for Ford Cars

\$25.

PAYS FOR ITSELF MANY TIMES
A YEAR.

DOES NOT AFFECT THE POWER

The MONARCH GOVERNOR operates by the velocity of the gas as it passes from the carburetor into the intake manifold. There are no shafts or gears—nothing to get out of order. Doesn't even need oiling. While it will not permit the motor to run beyond a predetermined maximum speed it does not affect the pulling power. It is impossible for the driver to change the maximum motor speed because that adjustment is Yale padlocked—the owner holds the key. It is operative the instant the motor starts—both while the car moves and stands still. Idling the motor at high speed is impossible.

EASILY INSTALLED

Any mechanic can install a MONARCH GOVERNOR in a few minutes. Complete instructions accompany each governor. There are no holes to drill and no mechanical changes.

BIG OPPORTUNITY FOR DEALERS

Wherever Fords are used for delivery service or as tractors, dealers are selling MONARCH GOVERNORS. They are easy to sell because they have long been needed. The field is too large for us to handle by direct shipments to owners. We prefer to turn this big business your way.

Send today for our dealer proposition. There's a big opportunity in your city right now. Each day it grows larger. Write at once.

Monarch Governor Company

524 Bethune Avenue West,

DETROIT, MICHIGAN

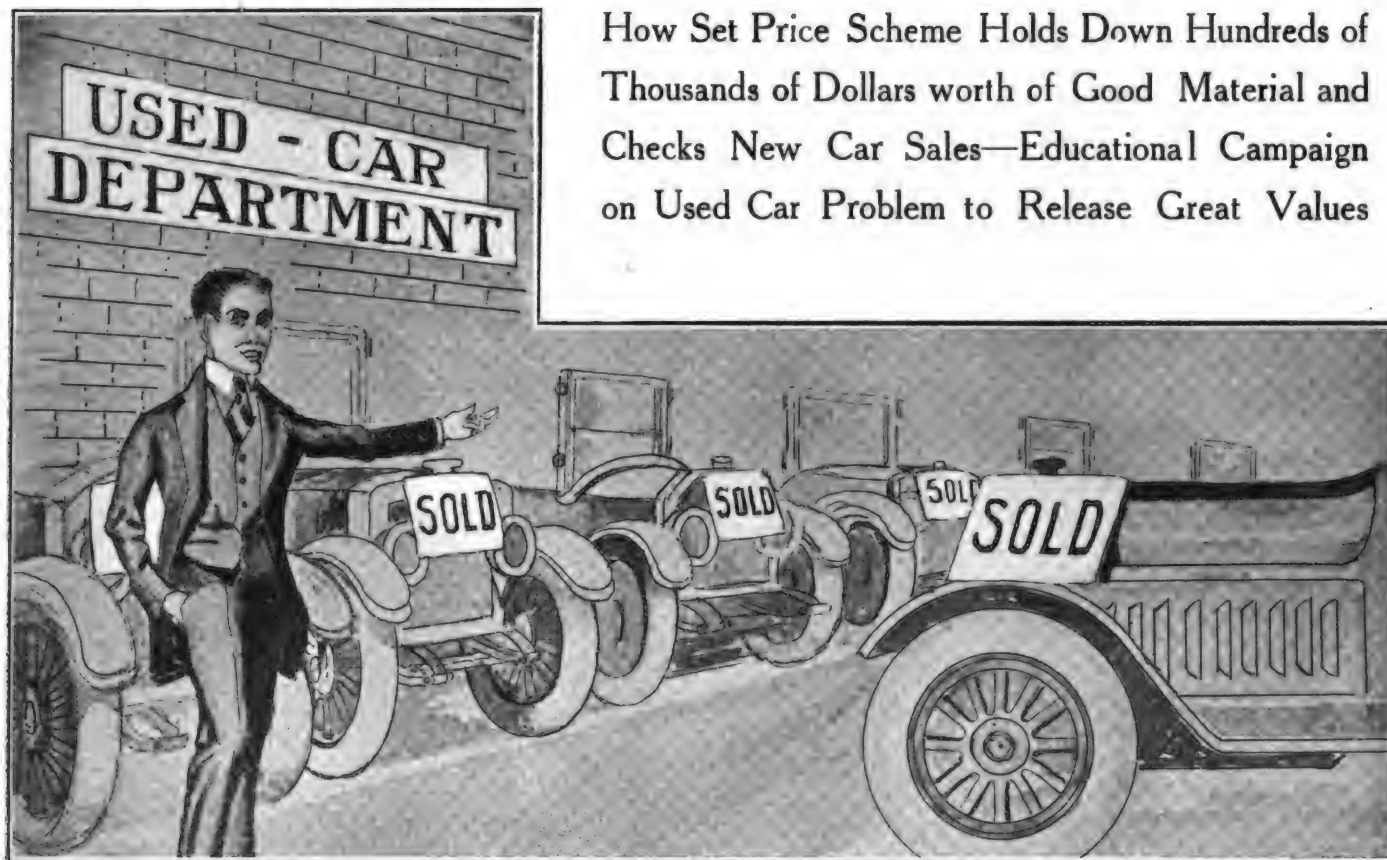


(When Writing to Advertisers, Please Mention The Automobile Journal.)

The Automobile Journal

Restored Cars as a Business Proposition

How Set Price Scheme Holds Down Hundreds of Thousands of Dollars worth of Good Material and Checks New Car Sales—Educational Campaign on Used Car Problem to Release Great Values

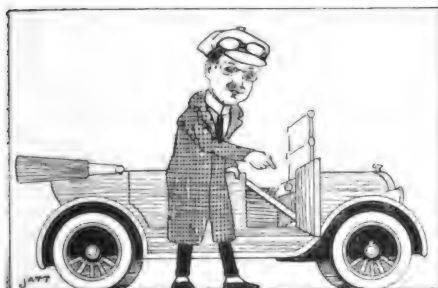


AUTOMOBILISTS and automobile interests perceive with the Automobile Journal that the first place to check wastage of good material bound up in hundreds of thousands of motor cars now in service, as well as of the thousands daily poured upon the market, is to protect them from false depreciations such as would be entailed if arbitrary, mean, under value prices are allowed to be marked against them. Vigorous opposition to schemes in the market to set low prices upon used cars is the surest way to dissipate stagnation in the car selling market. The plan of a fixed price per model on a car, without regard to its mechanical condition, except, perhaps, for the point that it is capable of operation, has brought nothing but discouragement to the dealer, indignation to owners and burdens of all sorts to the manufacturer.

needs have grown beyond the car and he wishes to dispose of it, will avail. The search for this real value must be made. This will not be found by looking at the name plate, getting the year of manufacture and looking in a little red book giving a depreciation curve and a price per model. Machines can no more be taken in that way than they can be sold in that manner after they have undergone overhauling, repairs and replacement of parts.

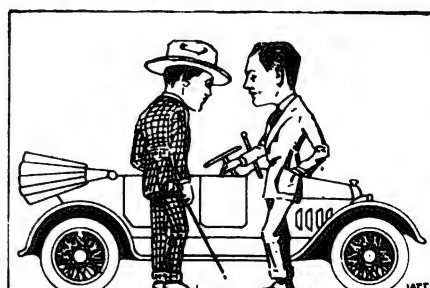
The actual solution of the used car problem concerns equally the owner, dealer and manufacturer. Their individual interests are at stake in every transaction, as well as their combined interests. The object of barter has nothing whatever to say about the matter. It will respond under operation to its possessor, no matter who that is, in just exactly the amount of service that is incorporated in its vitals.

The ordinary distributor, therefore, occupies a unique position in middle ground. He is both buyer and seller. He must buy a machine with all of its possibilities, its depreciations and defects, and before he can become seller of it again, be the re-



One Thousand Miles the First Month in a Restored Car.

As it has been repeatedly shown that eight exchanges are at the base of every 10 new cars sold, no attempt to slur over the real values that exist in a car that has seen a certain amount of service, simply because the owner realizes that his



Used Three Years and Still Going Strong.

pairer and rejuvenator; put new life in the machine and give some guarantee that it will give satisfaction to its new owner.

Dealers recognize their share of the burden perhaps more fully than others. They have said to this journal that the campaign for the education of the public to the values in used cars is an excellent thing and worthy of all encouragement. They want to see the problem solved. They are anxious to specialize, if necessary, to help overcome stagnation in sales and, above all, they do not want to be smothered with price fixing complications.

Dealer in Pivotal Position.

Seeing that the dealer is in this pivotal position, it is all important to give him a chance to specialize in the buying and selling of used cars. Owing to wide variations in the trade it is something of a vague proposition to define a dealer. The ordinary, individual garage man, who may sell a handful of cars a season, makes inquiry if it is necessary for him to specialize in the buying and selling of used cars. Yes. If he doesn't want to get stuck he must. If he doesn't want to close up he must. If he doesn't want to go bankrupt he must. And what about the big agencies, some one inquires? It is to be observed here that the new National Automobile Dealers' Association, organized the early part of this month at Chicago, receives a branch manager as a member. Must the branch manager specialize in used car business? Undoubtedly he must. He must drill something more than parrot language into his salesman's selling talks. He must handle the used car problem as an asset to the business rather than as an incidental in the profit and loss account.

Whether it be on large scale or small, the happy dealer is the one who can hang a "Sold" sign on his cars almost as fast as they come out of the overhauling shop. The average dealer has sifted many of the so-called systems for accelerating the sales of used cars, and in general found them wanting. He may have run after a will-o-the-wisp which winged its way into the trade with the alluring proposition that by following a schedule of flat allowances on trade in machines the problem would be solved, only to find that it cost him several good customers and lost him sales.

While it seems a stubborn problem to grapple with, improvement begins in business as soon as it is thoroughly realized that practicality must be applied in every used car deal. Every time a used car is put in a mechanical condition so that it will give its new owner service and satisfaction, the ultimate solution of the problem is that much nearer in every individual case. The public, generally, is impressed with the enormous increase in the business in used automobiles—both passenger cars and business wagons—and the extent to which high grade and reputable business houses are buying used cars.

Set prices for allowances on cars offered in exchange, when unreasonably and wrongfully arrived at, such as yearly depreciations without reference to their mileage and care, nips business in the bud. The dealer does not have half a chance if some hidden oracle is able to set prices for him and make him swallow them whether he wants to or not. Not a single dealer approached on this subject but has declared that arbitrary set price schedules on used cars ought to be run out of the business. Not a single dealer but declares that a just and liberal valuation is the only one that is fit and proper to be established on a used car. There is nothing else to it. The dealer must know values. The car owner today knows value and he demands it.

No Accessories for Non-Operating Car.

Seated in a public conveyance the other day a young man

was overhead to say: "Yes, I got my car last November, and I got it going for the first time yesterday." Months were spent in the search for the particular stoppage and no doubt considerable money was spent with garage and repair men. Reflect, however, for a moment on the lost business to the rest of the trade, because the seller delivered a car that would not go. No gasoline, no tires, no accessories sold to that owner for almost nine months, just because the fellow who sold him the car had to tinker with it from midwinter to midsummer.

The automobile trade and all its offshoots demands that cars will operate as the first requisite of business at all, let alone expansion of business. Such instances, however, serve to point that cooperation in sound used car business methods is essential to the well being of the whole automobile industry, as well as to the best interests of the persons most directly involved.

A survey of the used car business with reference to the set price theory discloses that successful dealers in used cars do not depend on a price guide in their transactions. Some very interesting points are turned up in this survey and they are given in the article on the next page for the benefit of the owner, dealer and manufacturer.

The car owner is as much interested in car life as the dealer is in car business. The two are very closely related and information for one is education for the other.

Practical usage demands that parts of a car be restored from time to time, thus enhancing its value and giving it

more serviceability and more mileage. It matters little whether the car remains in the same hands or is transferred to the ownership of another. The service of which the car is capable is in the machine.

Further pains will be taken in succeeding issues to show, through the histories of some cars, how car life is extended according to the changes which are made from time to time in their equipment and usage. All of these facts are collected with the view of impressing motorists and others that the ownership of a car in these days is an economical necessity. It is further evident that many who have been car

owners for a long time likewise need to have a fuller realization of the fact that their cars are not to be handed down as heirlooms in their families, but are destined to go by exchange to the hands of others who have exact needs for the used car while that owner himself presents himself in the market and duly indulges himself in a new machine.

The facts given from time to time all go to prove that the campaign of education demonstrating the actual service life of cars furnishes the logical solution of the used car problem.

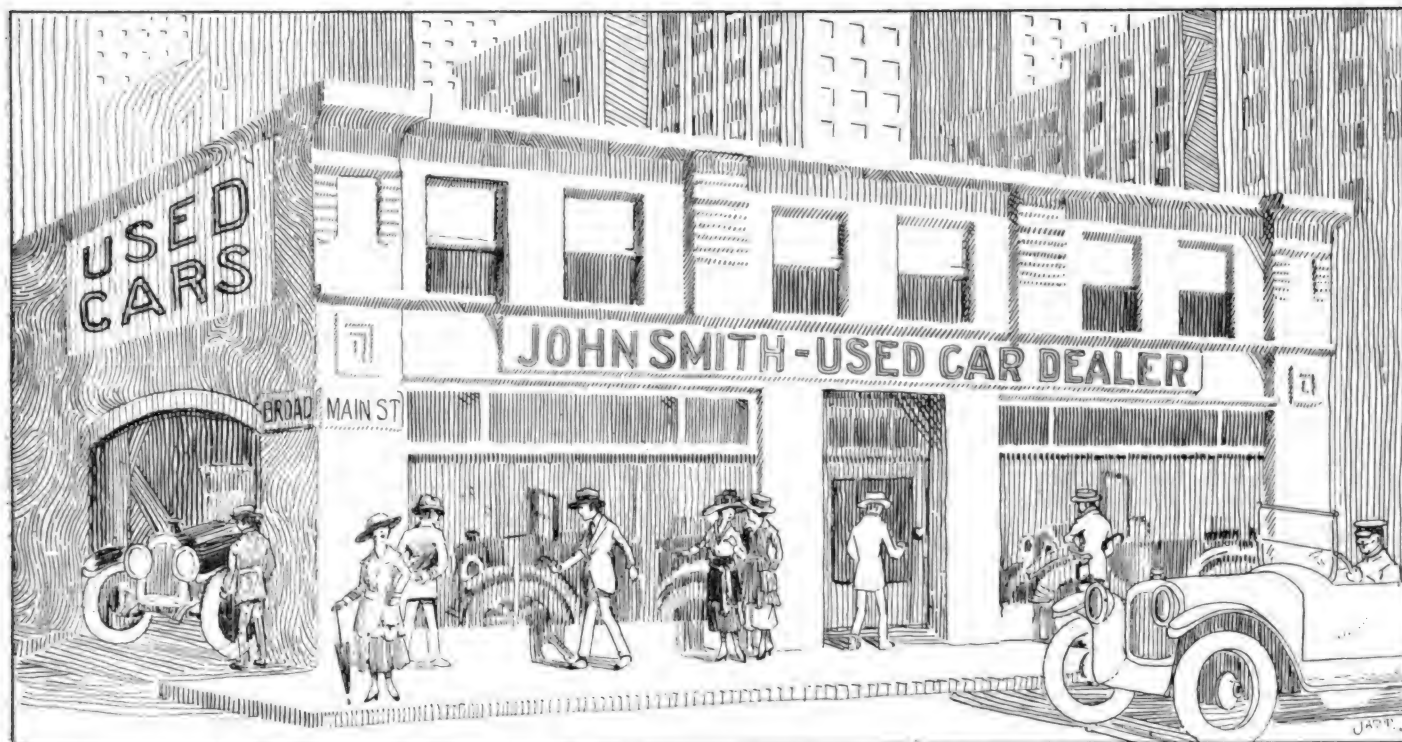
Savings in Restoration.

The economies that are to be conserved by making a thorough examination into the possibilities of car restoration are manifold. There is something in this matter for every owner to give attention and study.

It is not the mere fact of conditions in the transportation world in this era of world-wide war which brings this question home to every owner. It is not alone the fact that the problem of disposing of a machine by the owner has given rise to sales clubs and numerous kindred enterprises. The ordinary owner may not allow himself to be too busy with his current business affairs to protect his cars' value from the raids of set price systems. The automobile world, as a whole, is rallying to the crying need of practicality in the handling of the used car problem, including owner, dealer and manufacturer.



Guarantees Against Defects Possible by Carefully Going Over the Car.



Restoring Their Merits to Used Motor Cars is the Greatest Factor in Bringing the Used Car Business to the Front Streets Where General Trade Proudly Lifts Its Head.

WHAT GROWTH OF USED CAR BUSINESS TEACHES

Presents Great Possibilities as a Real Business to the Dealer
Who Will Specialize in This Branch of the Automobile Trade

THE used car business as a real business is establishing itself rapidly in every city in the country and presents great possibilities for the dealer who wishes to specialize in this new branch of the automobile trade. Most dealers have been prone to consider the used car as a negligible problem, and consequently have devoted little attention to its solution, with the result that their business has suffered.

With the bulk of the new car sales involving a trade in of a used car, and with thousands of used cars on the market, the question of handling the second hand car is one of the most important now confronting the dealer. A number of the larger manufacturers and distributors have extensive specialized departments for taking care of used cars of their manufacture, and they also go into the distributing end of the business as a means of establishing a good market for these machines, which in turn helps the sale of their new machines.

This situation, as explained in previous articles in the Automobile Journal, has resulted in the attempt to establish an arbitrary value on old cars, which attempt, however, has met with failure owing to the many different considerations that enter into the fixing of a used car's value. Yet there are organizations and a few automobile trade papers that still advocate a set price on used cars.

According to dealers who have been in

THERE ARE ALWAYS BUYERS FOR AUTOMOBILES.

The man who makes good today is the man who grasps the opportunities lost by the fellow who sleeps. No matter how dark the times may look there are always customers for automobiles and other commodities.

Automobiles today can't be sold with \$7 Stetsons kicked up on a roll top desk or with one foot resting comfortably on a brass rail.

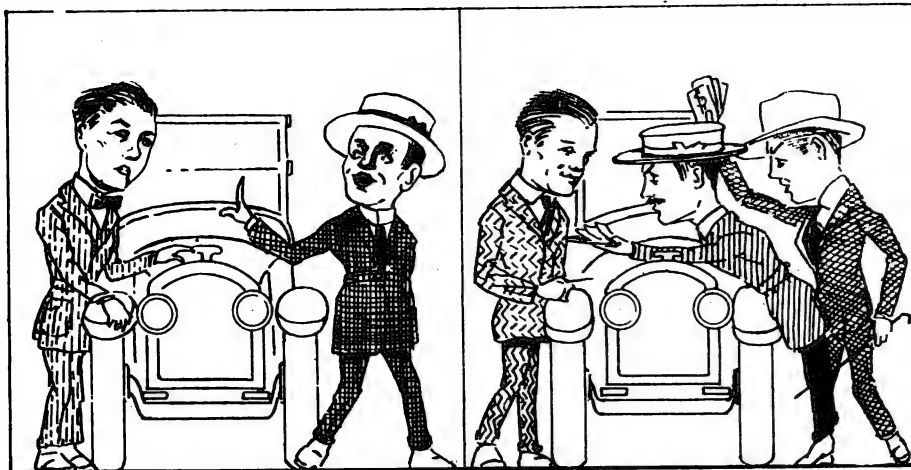
The one best bet in life is cheerfulness. Good nature is your greatest asset. Learn to smile even if some competitor has given you a solar-plexus and you find it difficult to breathe.

Analyze. Make everybody about you work—let your slogan be "Energy is the yeast that raises the dough on pay day." If you don't you won't fool anybody but yourself. When you begin to fool yourself you might just as well take your pipe, beat it to a cozy corner and sing "Auld Lang Syne." Life is over for you. The curtain is down. You are only good for a newspaper story. It's not what you were—it's what you are today. —H. C. Bradfield, King Motor Car Company.

the business for several years and who dispose of a large percentage of the used cars that come on the market in their localities, the proposition is one that should be specialized in, as it requires an extensive knowledge of conditions in various markets, knowledge of values and ability to determine the conditions of a machine without pulling it apart.

As a permanent business it must be conducted with the same principles of square dealing that are necessary to make any business endure and a dealer should so arrange his transactions that he can guarantee his statements regarding a used car, and also stand ready to make good most any defects within a reasonable period of time. He can protect himself in making such guarantees by carefully going over the car before it is offered for sale and determining what repairs or adjustments are necessary to place it in first class condition. The used car should be repaired and placed in good order, in any event, before being sold, as even though the dealer in disposing of a car tells his customer of the existence of certain defects and troubles, the latter will feel as though he had been imposed upon should any of the imperfections prove a source of trouble.

The used car dealer is also accomplishing a big stroke of advertising if every car that he sells proves that it is all that he said it was. Many dealers through adopting this policy have sold



A Restored Car Disdained in Providence Gets a Crowd of Buyers in Manchester.

several cars to the same customer or his friends. It is a business that also develops a large repair and replacement trade and most second hand dealers find this feature very remunerative as a side line, which also includes the sale and repair of tires.

Energetic Methods in Business.

With a solid foundation to work from the used car dealer can go after his customers through the regular channels of trade, either by advertising or by solicitation. He takes care not to waste his money advertising cars at exorbitant prices or spending money to get rid of a car in which there is no margin of profit. In his advertisements he states the make and yearly model of the car—condition briefly—and the price, although the latter item is not always included, owing to the attitude of some buyers in making their deals. Some will want to have alterations made or equipment added to the car or taken from it. The primary object, however, is to make the terms of the deal clear and obviate unnecessary dickering so that quick sales can be accomplished, it being of considerable importance for the used car dealer to secure a quick turnover or else he will suffer from having his capital tied up and cars run into money very fast.

The question of second hand car values, which has been discussed at some length in treating with the subject so far, is one in which many influences are felt. Market conditions that are peculiar to different localities are the biggest factors to be taken into consideration, in some cases even ahead of the make and model of the car.

These conditions will vary in their effect on any certain make in accordance with the extent to which the distributor of that make furnishes service for his customers or the value that he places on cars offered him in trade. Sometimes the make of a car is the ruling influence in shaping such a condition, but in many instances market conditions are directly in proportion to the popularity that a car enjoys in a certain locality, resulting either from its reputation for serviceability or because it has been energetically pushed by an exceptionally progressive dealer.

In one of the New England cities recently a car dealer called up the used car dealer and asked the latter's advice as to how much he thought should be allowed on a 1917 Blank car. The car dealer was mystified when the used car dealer said, "Well, I wouldn't give \$400 for it here; but if I had it up in a certain town in New Hampshire I would give \$600."

When asked to explain this paradoxical influence on values resulting from territorial locations, the used car dealer explained: "You understand there is no service station in this town for that car and very few people own them. So the car not being well known few people want one. But up in New Hampshire there is a town where a hustling dealer has placed several hundred of those machines and they sell just as easy as a Ford would around here."

Here we find a factor in affecting values much like that existing in the clothing business. A ladies suit that would sell for \$50 where it was fashionable wouldn't sell for \$10 out in Lead City, Nev., if it could be sold at all, yet in both places it would possess the same economic value so far as providing a covering and warmth for the body.

Popularity of Make Counts.

In other words, considerable of a car's value is vested in its popularity, a fact

which any used car dealer will testify to as the result of his dealings with purchasers.

When the used car dealers first began to crop up and car distributors began to establish used car departments in separate buildings, the tendency was to locate in some out of the way place where rent was cheap, this attitude being taken evidently on the principle that because the goods were not brand new they must be sold from an obscure tumble down station. The wiser dealers, however, were not long in recognizing that these used cars were just as much merchandise as the new cars they were selling and that successful methods of selling them could only be adapted after those practised in all business.

Successful Selling Methods.

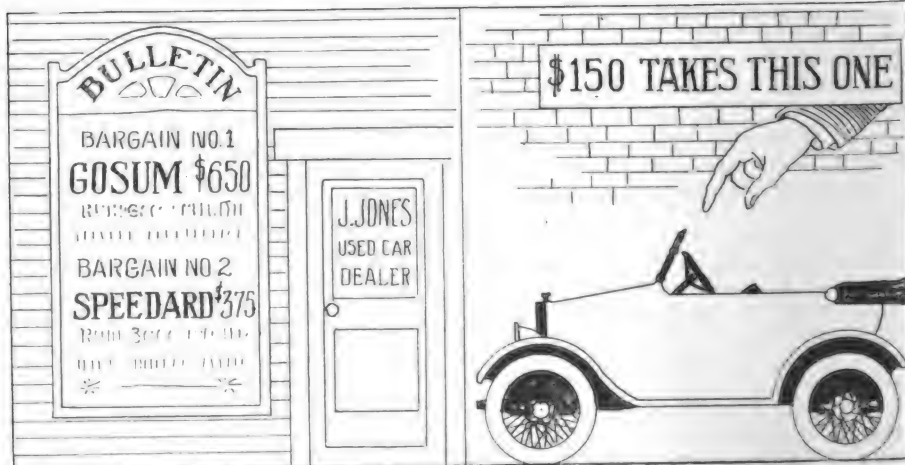
If an up-to-date shop on a main thoroughfare promoted the sales of new cars it should have the same effect upon used cars, a fact which was demonstrated in the action of several of the best known distributors in the country who after using makeshift quarters for their used car departments moved them into the retail automobile sections of the city. This was a logical place to find buyers of cars and they soon found that, considering the results, rent was the cheapest thing they paid for in their overhead.

Cheerful surroundings with plenty of light created a better atmosphere in which to display the used cars and did much to dispel the effect of tawdriness and dilapidation that is usually felt in the presence of used goods in a ramshackle shop.

The cars were kept clean, polished and dusted every day and regular salesmen assigned to the departments. In brief, it might be stated that the same business principles and methods should be adopted in selling the used car as in distributing new ones. There are no mysterious or unusual phases to the business, nor could it be considered an undignified calling on account of the nature of the goods handled any more than the real estate business which involves the resale of property over and over again.

Developing His Market.

A live dealer is not long in the used



Bargain Days and Shop Door Advertising Are Found as Effective in This Business as Any Other.

car business before he begins to feel his market and in that way he gets an accurate line on values as established by what a car can be bought for and what it will bring, which is the only safe criterion on which to operate. His advertisements bring him in many inquiries, through which he discovers the trend of the demand, and while he may not have a car in stock that is wanted, he has a lead on which to work in buying cars so that his sales will be quicker. He soon knows the nature of the wants in his locality and can buy right and sell right; hence, seldom finds himself with a car for which there is no demand, or which he cannot sell at a profit.

Through handling many cars of different makes and models he soon learns to ascertain their condition with little trouble and can appraise their value quickly. He becomes like an expert in

judging horses or real estate, and can tell almost at a glance what a car will sell for, a knowledge which enables him to transact his business with dispatch. This is a most valuable asset in the used car trade, as not so much time is consumed in closing deals as in distributing new cars.

Men will often come into a used car sales room and pay over from \$400 to \$1000 for a car within half an hour after arriving, while in the sale of new cars purchasers often haggle over their purchase for days before deciding. They know that they can get that same model of a new car at the same price most any time, consequently are not in a hurry to arrive at a decision, while, in considering a used car, if they become decided upon it and are satisfied with the price they do not know how long the opportunity to purchase it will exist, or

whether such an opportunity will crop up again unless they avail themselves of it immediately.

At one time car prices were strongly affected by seasonal influences, and used cars were more plentiful in the late fall and winter than at any other time. But of late years the custom of using cars throughout the year has become so general that the variations in prices with the seasons is far less marked. The more general rule of discontinuing the practice of announcing new yearly models is also having a favorable effect upon second hand values, particularly the values of those cars manufactured by makers who no longer designate their cars in yearly series. It is obvious that when the used car business is established generally on a sound basis that car manufacturers, dealers and owners will be benefited alike.

Typical Used Car Offerings in Eastern Cities

Offerings in New York Papers

STEARNS-KNIGHT "8" 1916 TOURING.
VERY EXCEPTIONAL.

PRICE \$1100.

Is practically new; has had very little use; mechanically absolutely O. K.; paint—looks like it was still on the showroom floor; tire equipment—all shoes practically new and there are two extra inflated non-skid Firestone for spares; has every equipment and is ready to be used immediately without an expenditure of any kind; is open for mechanical inspection or demonstration.

1917 Studebaker roadster, \$625.

1916 Roamer 4-passenger touring, \$1100.

1915 Overland coupe, \$500.

1915 Jackson, 5-passenger touring, \$575.

1914 Lozier 7-passenger touring, \$850.

Above cars are in good operative condition. Fully equipped, including electric lights and starter. Write or phone your requirements.

OVERLAND, Model 82, seven-passenger, Overland 6 Red Seal Continental motor; family car; ran less than 6000 miles; excellent condition; fully equipped; will sacrifice for immediate sale; \$550.

SELECT USED CARS.

1916 5 pas. Chevrolet, many extras, \$425.

1916 4 pas. Special Stutz Bulldog, \$1600.

1916 Mercer raceabout, extra good condition, special windshield and top, \$2300.

USED CAR BARGAINS.

1915 Stutz, 4 pas., Victoria top, \$1100.

1916 Studebaker, 5 or 7-pas., 4 cyl., \$500.

Latest model S. G. V., Sedan, self-starter, Westinghouse shock absorber, in perfect condition, \$950; Overland coupe, 4 pas., \$700.

FOR SALE—Willys Knight 1916; just overhauled and guaranteed in perfect order mechanically and otherwise; has full equipment, including extra shoe and three extra tubes; will sell for \$500.

Ford 1916 touring, \$225.

Ford 1916 touring, \$175.

Chevrolet 1916 Baby Grand, \$500.

Studebaker, series 17, touring, \$600.

A SPECIAL OFFER.

\$1600 buys Twin Six Packard roadster; fully equipped. This car is in first class condition in every respect. Cash only.

OLDSMOBILE 1916 five-passenger model 43; perfect condition; extra shoe; \$625.

Examples Taken From Boston Papers

DODGE BROTHERS ROADSTER, \$550.

1916 production; it is conceded that this is the smartest roadster shown this year; lots of room for luggage as well as for occupants.

1916 MITCHELL TOURING, \$865.

7-passenger, overhauled at expense of approximately \$130 at Mitchell company's service station; not run since.

1917 MAXWELL, \$525.

Small, light, economical family car; before purchasing car of this type elsewhere examine this one and take demonstration without obligation.

1916 CHEVROLET TOURING, \$375.

Choice of two snappy small cars; lots of pep; condition good; tires excellent.

1917 HUPMOBILE TOURING, \$950.

Very latest model and almost brand new; Goodyear cord tires and extra and full guarantee; cost \$1450; owner going away only cause for sacrifice.

1916 JEFFERY TOURING CAR, \$500.

Perfect shape, fully equipped, looks and runs like new.

1916 BUICK, \$800.

Big six, 7-passenger, Goodyear cord tires, used less than 500 miles, car guaranteed in first class mechanical condition; original paint; looks like new; call early for this powerful car and take a ride.

1915 BUICK, \$600.

C 55 model, 7-passenger, very powerful and full of comfort; just the ideal touring car; practically new tires, extra spare, paint like new; call for ride; will demonstrate anywhere.

1915 CHANDLER, \$485.

5-passenger; cost \$1595 and is like new throughout; all shoes in finest condition and paint perfect; powerful, easy riding and a very quiet motor; fully guaranteed; get this early.

1916 KISSELKAR SEDAN.

One of the most desirable models for general family use that we have to offer at the present time, among the less expensive cars, is this 5-passenger sedan. It is fitted with all-year-round convertible type body and while distinctively a man's car, it can be handled very easily by a lady. This is a very economical car to operate and is an extraordinary bargain at \$725.

1917 COLE "8" CHUMMY, \$1350.

Roadster; driven but 2200 miles; not a mar or scratch on paint; in fact it would be hard to tell the difference between this and a new car.

1917 CHANDLER TOURING CAR, \$950.

Driven very carefully but 6000 miles by a lady; all new tires and in fine condition; traded for a Willys-Knight.

1916 SAXON ROADSTER, \$550.

In beautiful condition; tires and paint like new; just the car for a man that wants a light six.

1915 STUDEBAKER ROADSTER, \$350.

A three-passenger runabout; recently repainted; good tires.

NEW OVERLAND, 7-PASSENGER, \$650.

Model 86; cost \$1285; only used six weeks; just as good as new. Call for quick bargain.

\$385—1916 MAXWELL ROADSTER.

In perfect condition.

1917 MAXWELL.

With combination summer and winter top; \$375.

1917 JACKSON TOURING CAR, \$725.

Only run a few miles; positively like new in every detail; had full factory equipment, demonstrated and guaranteed.

1916 CADILLAC TOURING, \$1250.

Run less than 4000 miles by present owner, who must realize cash at once; fully guaranteed and thoroughly demonstrated; call at once.

1916 CHALMERS RUNABOUT, \$450.

Has had very little mileage and looks and runs like a new car; powerful, speedy and easy riding; light and inexpensive to operate.

COLE "8" ROADSTER.

1916; in absolutely perfect condition; run only 3000 miles; cannot be told from brand new; all oversize tires, one new spare never used. We consider this the best buy in Boston; price \$1100.

\$585 buys 1916 Dodge, 5-passenger, summer and winter top; practically like new in every detail; is fully equipped, many extras, economical to operate; you must call and see this car to fully appreciate its real worth; we will demonstrate thoroughly and allow a trial of 30 days and sell on partial payment plan.

1916 Apperson Jack Rabbit, 7-passenger, with revolving seats; cost new, \$2100; almost as good as new; selling price now \$785.

1917 FRANKLIN.

Four-passenger, practically new; run less than 2000 miles; the most economical car on the market today; call early, as this must be sold; owner going away.

1916 OLDSMOBILE, \$550.

Four-cylinder, 5-passenger, two to select from; newly painted and in extra fine condition; just the car for small family; very economical to run; call early for these as they won't last long.

1915 KING "8" ROADSTER, \$550.

In the finest possible condition; has self-starter, electric lights, speedometer, clock, extra new tire and rim; tires and paint like new; very inexpensive, comfortable and powerful to run; call early for this.

1915 HUDSON 6-40, \$525.

Seven-passenger, been thoroughly overhauled and painted and is a fine, light car; suitable for family touring or renting purposes; very easy riding, light and inexpensive to operate.

1915 OVERLAND ROADSTER, \$395.

Model 80; cost \$1100; looks and runs like new; has had the best of care; very quiet motor; all in the best mechanical condition; don't miss this for a real buy.

1917 CHANDLER.

Almost brand new; run less than 1000 miles; must be sold this week at a big sacrifice; owner needs cash; call for demonstration; free labor book never used; call early.

1917 Studebaker, 7-passenger; practically new; two to choose from, \$700.

1916 Inter-State; used only by lady a few months; 20 miles to gallon of gasoline; price \$550.

1915 Reo Six Touring Car; in excellent condition; \$750.

1916 MAXWELL CABRIOLET.

If you have in mind the selection of a small two-passenger car you will like both the smart appearance and mechanical excellence of this very attractive cabriolet. With the top set back this automobile is entirely open; when desired it can be changed into a closed car very quickly. We would like to show you this car and let you be the judge of its special merits. The tires, paint, upholstery and all other details are first class in every respect and the car is yours at \$600.

1917 Pullman, 4-passenger Chummy Club Roadster, \$600. A small, compact, exceedingly smart and trappy appearing car; very economical in operation, splendidly equipped and the ideal popular type of car. Come in and look it over. "Money-Back Guarantee."

1916 Stearns-Knight, 5-passenger, \$850. A car that is in exceptionally fine condition, having had very little mileage. Unusually well kept up, easy riding, quiet in operation and a splendid hill climber. Tires are 34x4; nearly new non-skid all around, and this is an exceedingly economical car to maintain and operate. "Money-Back Guarantee."

1916 Mitchell, \$700. A well built, beautiful 5-passenger touring car that has been carefully taken care of and always driven by one person. "Money-Back Guarantee."

1916 Hudson Six-40, 7-passenger, \$800. Rarely do we have one of these splendid economical, light weight, yacht line, 7-passenger cars to offer. When we do it always meets with a quick sale. This car has just come through our shop and is in exceptionally fine condition. "Money-Back Guarantee."

1916 Jackson Eight, \$750. This is an especially comfortable, roomy, 7-passenger touring car, with special upholstery, all good tires, lots of extras. "Money-Back Guarantee."

1916 Mitchell "6," 7-passenger, \$600.
1916 Chalmers touring car, \$575.

1915 Dodge touring car, \$490.

1917 Studebaker "6," 7-passenger, \$700.

1916 Overland "6," 7-passenger, \$550.

Some Advertisements in Providence Papers

1916 Ford touring car, just painted and overhauled; new tires; perfect running condition; \$250.

Studebaker, series 16, all new tires, one extra, good condition; \$400.

Overland, 5-passenger car, 1916; cost \$700; only used 3000 miles; sell for \$450 cash.

Reo 4-cylinder; latest model; touring; new tires; perfect condition; almost new car; \$600 cash.

1915 Ford touring; crown fenders, over-size tires, speedometer, electric lights; \$225.

1917 Chalmers touring, \$900. Model 35 B; 7-passenger; overhauled and painted.
1917 Chalmers touring, \$850. Model 35 A; 5-passenger; overhauled.

1917 Chalmers roadster, \$850. Model 35 A; 3-passenger; overhauled and painted.

1916 Chalmers touring, \$800. Model 6-30; overhauled and painted.

1916 Davis roadster, \$750. Chummy style; overhauled and painted; wire wheels.

1915 Empire roadster, \$425. Electric lights and starter.

1915 Regal touring, \$400. Overhauled and painted; electric lights and starter.

1914 Studebaker touring, \$385. Model 4; electric lights and starter; overhauled and painted.

1913 Studebaker touring, \$275. Model 4; best of condition.

1913 Stoddard-Dayton, \$485. Seven-passenger; fine condition.

1915 Winton touring, \$1500. Little Six; overhauled, painted and new tires.

1915 Winton touring, \$1250. Little Six; best of condition. Call or phone for demonstration.

BIG FORD ACCESSORIES SHOW

Immense Popularity Indicated for the First National Exposition Held at Chicago in September

The National Exposition for Ford Accessories will be held in the Chicago Coliseum, in that city, Sept. 22-29. All exhibits will be devoted exclusively to the display of accessories, equipment and attachments for the Ford car. The entire main floor will be occupied, over 250 exhibitors having already reserved space.

The management is anticipating a large attendance and a plan has been adopted for drawing owners and dealers from all points throughout the central states. Nearly half a million tickets will be distributed among accessory and Ford dealers throughout that territory to encourage the attendance of persons directly interested in the exhibits.

Officers of the National Exposition for Ford Accessories, Inc., are: President, J. E. Duffield, treasurer and general manager of the Bailey Non-Stall Differential Corp., Chicago; first vice president, Charles Johnson, general manager of the Maltby Auto Specialty Co., Detroit; sec-

ond vice president, H. S. Irving, vice president of the Advance Automobile Accessories Corp., Chicago; secretary, W. Ralph, manager of Newsabout Fords, Chicago; treasurer, B. L. Gray, president Gray-Heath Co., Chicago; general manager, H. V. Buelow, Toledo, O.

Prominent accessory manufacturers in the country have already taken space in the show, including the following: Ahlberg Bearing Co., Chicago; Bill Automatic Spark Retarders, La Porte, Ind.; Crum-Wiley, Peru, Ind.; Advance Auto Accessories Corp., Chicago; Automatic Safety Tire Valve Co., Detroit, Mich.; Ton-A-Ford Truck Co., Racine, Wis.; Detroit Auto Products Co., Detroit, Mich.; Bailey Non-Stall Differential Corp., Chicago; Maltby Auto Specialty Co., Detroit, Mich.; Gray-Heath Co., Chicago; Sinclair Refining Co., Chicago; Wire Wheel Corp. of America, Buffalo, N. Y.; Simplex Mfg. Co., Anderson, Ind.; Graham Bros., Evansville, Ind.; The Zinke

Co., Chicago; Reliance Co., Chicago; H. G. Paro Co., Chicago; Perry Auto Lock Co., Chicago; Essenkay Products Co., Chicago; Mechanical Belt Co., St. Joseph, Mo.; Grant Wire Wheel Co. and K-D Lamp Co., Cincinnati, O.

MANAGERS OF USED CAR DEPARTMENTS TO ORGANIZE.

Managers of the used car departments of New York agencies have formed an organization for the purpose of working out problems that confront them in their branch of the business. The members are all connected with concerns belonging to the Automobile Dealers' Association of New York City and they will work under that organization.

L. J. McCracken of the Willys-Overland agency was elected chairman and Walter Broadhead of the Marmon agency vice chairman. W. H. Barnard of the Colt-Stratton company was elected secretary.

The production of Ford cars for the three months ending June 30 was at the rate of 1,000,000 cars a year, 270,000 being turned out during April, May and June, or an average of 3100 cars every working day.

USED CARS--RESTORATION OF THE FORD

How the Car Is Dissassembled for Examination and Repair— Methods for Replacement of Parts Most Subject to Wear

This is the second of a series of articles dealing with the purchase and restoration of used cars. It is the purpose of these discussions to show that a used car, one or more years old, has extensive service value, and that often, with but a slight outlay of time and the systematic replacement of a few parts, its usefulness can be increased greatly, making it for practical use, comparable with a new car.

It is the purpose of this and following articles to deal more with the so-called "pleasure vehicle" for its restoration to the same class of service than with the idea that the car is to be restored, or remodeled, and used for business purposes.

The third article of this series, which will appear in the Aug. 10th issue of the *Automobile Journal*, will be devoted to the restoration of the Chevrolet Model 4-90 car, and the replacement of such of its parts as are most subject to wear.

AFTER having purchased a used car the buyer, whether he is experienced automobilist or not, should become familiar with every detail and part of the machine. He should read the instruction book covering that particular car, and such general engine and car instruction books as he is able to obtain. To understand the instructions the car should be near, and the parts seen while the instructions are being read.

Whether he is a novice or an experienced automobilist, he should make it his business to know about every mechanical part and its mechanical condition. This can only be learned by inspection. Every car should be thoroughly overhauled at least once a year, and if the new owner is not familiar with the car and does not know the mechanical condition of the parts, immediately upon its purchase the used car should be overhauled.

Although a thorough overhauling is to be recommended, a partial overhaul is

sometimes sufficient. In any event, the new owner should disassemble the engine, gearset and rear axle, so that he may examine every bearing and moving part.

The critical examination of a newly purchased used car is both educational and of economical importance, for the reason that badly worn or broken parts can be replaced before much damage is done. It is obvious that considerable damage would often be the case were the repairs not made.

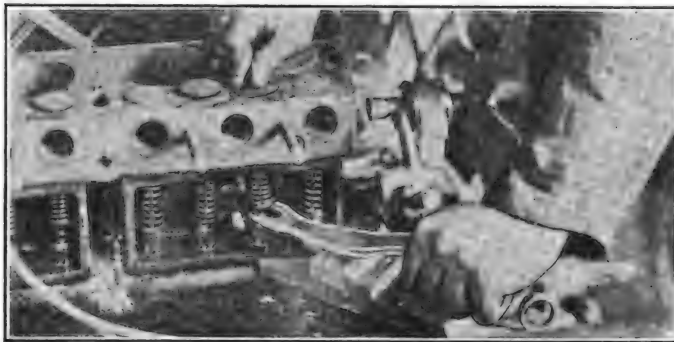
As an instance of this take the case of the man with his newly acquired used car leaving the garage in quest of someone to "burn" the carbon from his engine, as there was a noticeable knock. After driving a short distance the knock increased; then a connecting rod bearing cap broke and the piston was forced up through the cylinder head, damaging beyond repair the cylinder block and head, the piston and the connecting rod. Had this man made such an examination of his car immediately upon its purchase the accident would not have happened; the cost of replacing the broken parts was all out of proportion with simply the repair of the bearing.

New Parts Effect Savings.

Another point that should be emphasized is that of replacements. It is not a good plan to make repairs of all parts where repair is possible, for in many cases a new part would be much cheaper, and the result more satisfactory.

For the man who intends to do his own repair work, the tools need not be numerous; a good set of socket wrenches is essential, since many bolts about the engine and chassis are inaccessible with the ordinary wrench. A painter's block tackle is a good substitute for "brawn," for with it, where much lifting is required, one person can do the work of two or three.

The first Model T Ford car was built in 1908 and only a



Removing Valve Spring with Y Iron and Piece of Wood for Leverage.

few were made. In 1909 the design was changed and the Ford Model T, as we now know it, was produced. Since that time there have been made but few minor changes in the engine, transmission or rear axle. The general instruction for overhauling is the same. In most cases the repair parts for the earlier cars are similar to those of the present model, and, where they are not, it is an easy matter to replace an assembly of parts, bringing a unit of the car up to date.

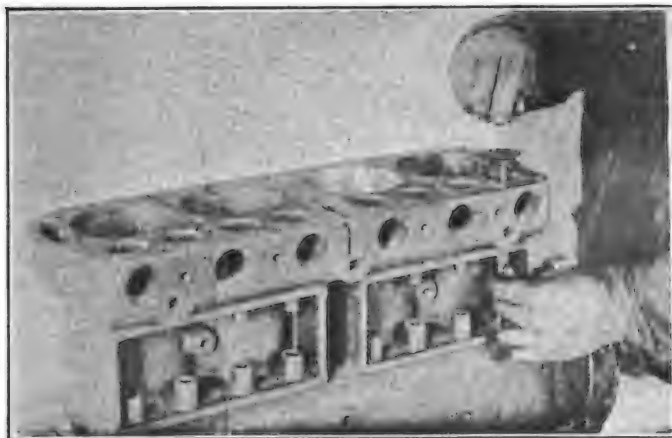
In partially overhauling the Ford engine it is not necessary to remove it from the frame. To overhaul the transmission gearset, however, one must remove the cylinder block from the chassis before this unit can be disassembled.

As a general rule, determining whether or not the gearset is in need of repair is possible without fully disassembling it. If the noise or grind is excessive, if the gears seem badly worn, a good plan is to take the engine block and gearset from the car and make all repairs upon the engine and gearset at the same time; in any event the engine repair work is the same.

Taking Notes and Tagging.

Before beginning the work of repair the owner should make written note of the relative position of all parts, numbering and tagging them so that he can replace them. He should note the position of the timing gears of the engine, marking them with a punch (if they are not already marked, so that they can be restored to the same relation).

A common cause of engine trouble is carbonization, resulting from a low grade of fuel. Carbon deposits are formed on the piston heads, in the combustion chamber, on the valves and in the exhaust passages. It is essential that this carbon be removed and the valves reground. To do this it is necessary to remove the cylinder head, the exhaust and intake manifolds, the valve springs and the valves.



Starting the Operation of Grinding in the Valve.



Piston and Connecting Rod Assembly, Showing Method of Removing Wristpin Clamping Bolt to Free the Wristpin.

Drain the water from the radiator and remove the two bolts which hold the radiator outlet hose connection to the cylinder head. (On the earlier models the hose must be removed as the heads are not fitted with a removable connection). Next remove the secondary, or spark plug wires, and the 15 cap screws which fasten the cylinder head to the cylinder block. The head may then be lifted from the block, thus exposing the cylinders and the valves.

Careful Work in Cylinder.

The top of each piston should be scraped free from carbon with a putty knife or broad screw driver. Great care should be exercised not to hit the cylinder walls with the instrument, since a slight scratch or cut in the polished wall may cut down the power and compression. For this reason the crank should be turned so that the piston upon which the work is being done is uppermost. In the same way the inside of the explosion chamber, in the head, should be scraped. A liberal application of kerosene oil and the use of a stiff wire brush will prove helpful in this operation.

After driving about 1000 miles, regrinding the valves usually is necessary. Lack of compression and the condition of the faces of the valves and seats will evidence the need.

Though it is possible to grind the

valves without removing the manifolds, this is not recommended to the novice, as some of the grinding powder may drop into the manifolds and later be drawn into the cylinders, scoring them and perhaps causing serious damage.

First disconnect the gasoline line at the carburetor, after having turned the gasoline off at the tank; then unfasten the exhaust pipe at the man-

ifold by unscrewing the large packing nut. The manifolds are both held by stirrups extending from four studs at the top of the cylinder block. The nuts should be loosened or removed and the stirrups can then be twisted or taken off, permitting the removal of the two manifolds. After the throttle lever has been unfastened from the carburetor, the intake manifold with carburetor attached can be removed from the car.

The lower part of the valves, the valve springs and tops of the tappets are enclosed in the later models. The covers, which are beneath the intake manifold and back of the carburetor, may be removed by taking off the nuts at the centres of the covers, thus exposing the valve tappets and the springs.

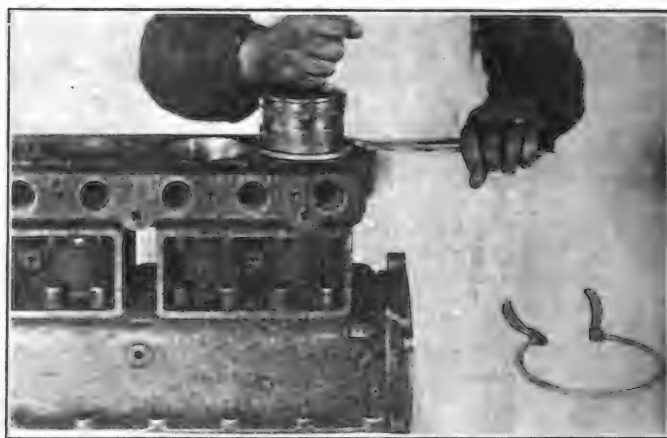
Various spring lifters and valve spring devices for compressing the valve springs to facilitate the removal of the valves can be bought. A bar flattened at one end and slotted to the shape of the letter Y is an effectual tool. An S shaped piece of wire fastens this bar to either of the manifold stirrup studs, or a block of wood against the frame can be used to obtain the leverage requisite to compress the spring against the cylinder block. When this is done the key through the lower end of the valve stem can be removed and the valve slipped up through the top of the cylinder.

Before removing the valves from the engine, they should be marked or stamped with a

punch so they can be replaced as before. There are eight valves: Beginning with the first or one nearest the radiator, the first, fourth, fifth and eighth are exhaust valves; the second, third, sixth and seventh are intake valves. The intake valves will probably be found to be in better condition than the exhaust valves, since the passage of fresh, cool gas over them prevents the forming of carbon upon them to a certain extent.

For regrinding but one special tool is necessary. It is for turning the valve and resembles a short letter Y, the two points fitting into the two holes in the head of the valve.

One can make a paste of very fine emery and oil, but it is better to use a prepared compound, which may be obtained at any automobile supply house. Apply a small amount of this to the valve seat and set the valve back into place. Then with the valve tool set into the two holes in the valve head, rotate it



Slipping the Piston Into the Cylinder and Using Ring Compressor to Contract Piston Rings.

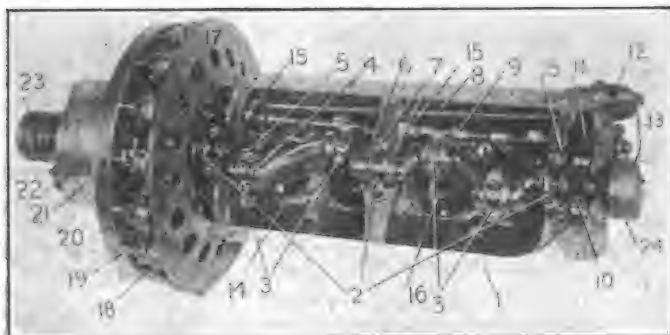
about 45 degrees, first to the right, then to the left, rolling it between the fingers and thumb. Lift the valve frequently from its seat (say after a dozen turns) and turn it around through 90 degrees, so that a different part of the valve will bear on each part of the seat.

Then repeat the turning, pressing on the valve tool just enough to hold the valve down on to the grinding compound so as to cut both the valve and seat. Then lift the valve and turn another quarter turn, continuing until the circle has been made.

The greatest care should be exercised to prevent the grinding compound from working into the cylinders. After the valves have been seated, which can be determined by the finished appearance of the surface, which should be without ridges and polished, the intake and exhaust ports, as well as the valves and seats, should be thoroughly cleaned with kerosene and a brush, in order to remove any grinding compound that might be lodged in these passages. If this is not done, it may mean great or irreparable damage to the cylinders.

Observations in Replacing.

Before replacing the valves and springs, each valve should be put into its respective place and the clearance be-



Cylinder Block Assembly as Seen from Underneath: 1, Cylinder Block Flange; 2, Main Bearings; 3, Connecting Rod Bearings; 4, Connecting Rod Caps; 5, Cap Bolts; 6, Main Bearing Caps; 7, Cap Bolts; 8, Oil Tube; 9, Camshaft; 10, Crankshaft Timing Gear; 11, Camshaft Timing Gear; 12, Breather and Filler; 13, Timer Case Clamp; 14, Piston; 15, Camshaft Bearings; 16, Wristpin; 17, Magneto Field; 18, Magneto Field Coils; 19, Magneto Magnets; 20, Flywheel; 21, Slow Speed Drum; 22, Brake Drum; 23, Clutch Spring; 24, Fan Belt Pulley.

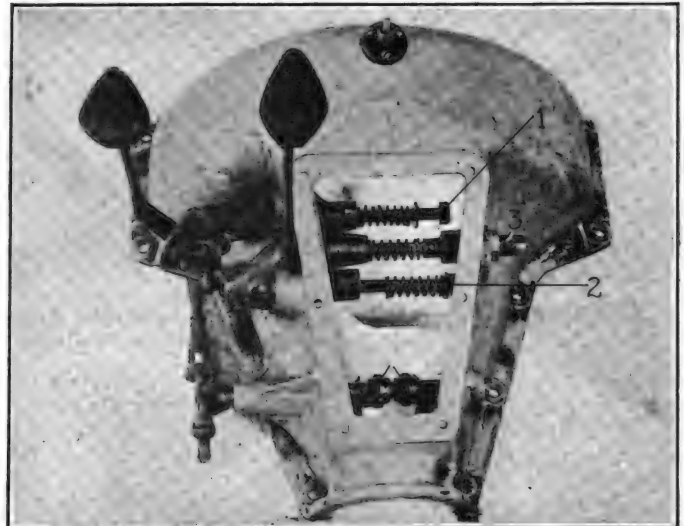
tween the valve stem and tappet noted. Each valve should be noted separately in the following manner: Turn the engine crank over slowly until the valve tappet has risen to the top of its stroke and returned, then turn the crank one-quarter of a turn more so as to be sure that the tappet is resting on the heel of the cam. The distance between the valve stem and tappet should be between $1/32$ and $1/64$ of an inch.

If the valve stem is too short and the clearance too great, it is possible to obtain special Ford valve adjusters, by which the valve clearance may be adjusted. If the valve clearance is too small the valve stem may be filed until the clearance is correct.

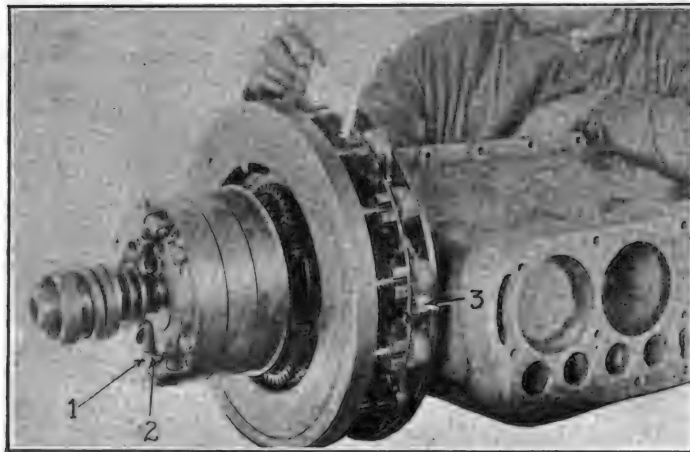
After the valves have been ground and adjusted the springs and collars may be put into place, the springs compressed and the key passed through the valve stem.

the base of the engine. This can be done through the lower drain cock on the back of the fly-wheel housing, at the right side, near the bottom.

After the oil has been drained from the case the cover of the crank case may be removed. This will expose the crankshaft and connecting rods. Engines made prior to 1912 have no crank case covers, and these engines must be removed from the chassis before the crank shaft and



Cover of Transmission Case and the Control Mechanism: 1, Reverse Adjusting Nut; 2, Brake Adjusting Nut; 3, Slow Speed Adjusting Nut.



Proving the Clearance of the Magneto Magnets and the Field Coils with an Ordinary Business Card: 1, High Speed Adjusting Screw; 2, Adjusting Screw Retaining Pin.

If the power plant is to be removed later, the manifolds and valve covers should be left off, otherwise they may now be returned. The cylinder head should be left off for the time being.

Treating Scored Cylinder Walls.

Now make a careful examination of the cylinder walls. If there are scores or scratches they will materially effect the operation of the engine and should be repaired. Deep scores may be filled by a plating process, of which the New Chemical Process Company, 6 W. Ross street, Wilkes-Barre, Pa., are specialists; or by the oxy-acetylene welding method. When the latter method is used the cylinders should be welded and finished only by experts in this particular line. There are many shops throughout the country where this work can be done.

Still another repair of the cylinders is possible; it is by reboring. There are shops that make a specialty of this work and when a cylinder is rebored it is, for practical purposes, as good as new. When cylinders are rebored, if the amount of metal removed is small, only new over-size piston rings must be fitted. But if the bore is large it will be also necessary to put in new pistons as well as rings.

The oil should now be drained from

hand and working it up and down, without, however, turning the crankshaft. Should there be the slightest play in the crankshaft end of the connecting rod it should be tightened if possible, and if not possible, the rod should be removed from the engine and either replaced or repaired.

Play in the crankshaft end of the rod can be taken up by removing the cap, and if there are shims between the cap and the rod, remove one or more or file them thinner, so that the cap can be tightened to the crankpin. If there are no shims the surface of the cap

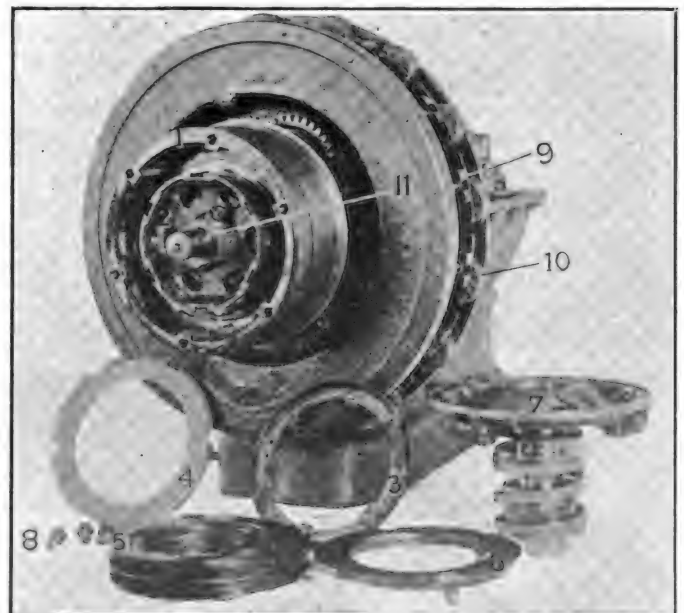
connecting rods can be repaired.

With the crank case removed the connecting rods should be examined. Play in either the connecting rod bearing where it is fastened to the crank shaft, or in the wristpin bushing, where the small end is fastened in the piston, can be located by grasping the rod firmly with the

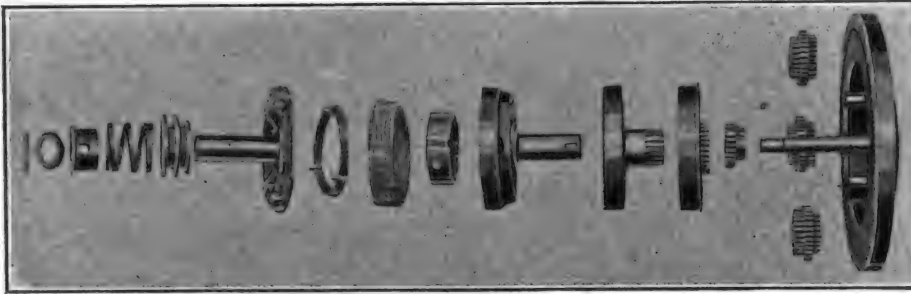
or rod may be filed slightly so as to allow the bearing cap to be brought up tighter.

If the babbitt is cracked or worn excessively thin, it is best to replace it or fit a new rod. To remove the rod from the engine; first, take off the connecting rod cap and then push the piston up through the top of the cylinder block. In any case where the caps are removed be extremely careful not to allow the piston to drop down so as to allow the lower ring to slip from the cylinders, inside the crank case. If this happens it is an extremely difficult matter to get the piston from the cylinder without breaking the piston ring.

The cost of a new connecting rod with



Transmission with High Speed Clutch Partially Disassembled: 1, Brake Drum; 2, Disc Drum; 3, Master Disc or Distance Plate; 5, Internal Driven Clutch Plate; 6, Clutch Push Ring; 7, Driving Plate and Assembly; 8, Driving Plate Screws; 9, Magneto Magnets; 10, Magneto Field Coils; 11, Disc Drum Set Screw.



The Flywheel and Transmission Gearset Components, Showing Them Disassembled, but in Their Relative Positions.

new babbitt is slight if the old one is returned in exchange. While the pistons are out of the cylinders is a good time to examine the piston rings.

The rings should be springy enough to exert pressure upon the cylinder walls at all times, allowing little or no gas to pass from the explosion chamber to the crank case. Should the rings be blackened this is evidence of gas leakage and they should be replaced; taking care in returning the pistons that the splits in the rings are not in line so that gas may pass through them, but are spaced on opposite sides of the piston. The installation of a set of so-called "compression proof," or "leak proof," rings often adds materially to the power of the engine, and prevents excessive oil leakage and consequent carbonization. The cost of this installation is small, and a practical time to make it is when the pistons are out of the machine.

Inspecting the Crankshaft Bearings.

The crankshaft should next be examined. Place a jack under the car, blocked to such height that it is possible to apply the lift against the crankshaft at either of the connecting rod journals, while it is in its topmost position. By working the jack up and down, and watching the bearings, one at a time, judgment will tell whether the crankshaft is loose in its bearings or not. If there is any play the cap should be tightened until it is taken up. If the caps cannot be made tight enough it will be necessary to remove the engine from the chassis and have the bearings replaced by a service station or expert repair man.

For further repairs to the engine, removal from the chassis of the engine block and gearset will be necessary. With two exceptions repairs on the transmis-

sion gearset cannot be made without removing the same, with the engine block, from the chassis. It is possible now to adjust the low, reverse and brake bands, as well as the high speed clutch. (These adjustments will be taken up later in this article.)

If it has been decided to remove the engine from the chassis, it may be done either after the above repairs have been made or at the beginning of the overhaul.

Removing Power Plant and Base.

The engine and transmission gearset are in one unit and called the power plant. The power plant base forms the lower part of the crank case, the flywheel housing and oil reservoir, and the lower part of the transmission gearset case. This base should be examined, particularly at the three points of suspension, where the lugs or hangers are riveted to it. Should the case hangers be loose, or the rivets of the front end bearing be worn, the power plant should be removed and when the base has finally been taken from the engine, the loose parts should be both riveted and welded to it, as welding makes a permanent repair. In this case the removal is as follows:

To remove the power plant and base from the car it will be necessary to remove the radiator and dash board, and disconnect the drive shaft unit from the gearset.

The radiator should first be drained (if this has not already been done) and the radiator hose at both the side and top of the engine disconnected. Then remove the two bolts which fasten the radiator to the frame; after disconnecting the stay rod, which extends from the radiator to the dash, the radiator may be removed from the car.

The dashboard is bolted to the chassis

at three places. Remove the bolts which fasten the dashboard braces to the frame. Then disconnect the spark and throttle control rods at the steering column. Next remove the drag link which is fastened to the steering ball arm, and remove the bolts that hold the steering post bracket to the frame. After the secondary and primary wires are disconnected from the dash, the dash may be removed from the car. It must be remembered that these directions only apply to the car as originally made at the factory. As the car ages, often angle braces are added and bolts and fastenings are designed to hold the body and dash together. These must be found before the dash can be taken off.

Before removing the wires from the dash, a tag with an identifying number should be attached to each loose end so that there will be no mistake made in replacing it.

After the radiator and dash have been removed the gasoline should be turned off and the gasoline pipe disconnected at the carburetor. The exhaust pipe should be disconnected from the manifold as

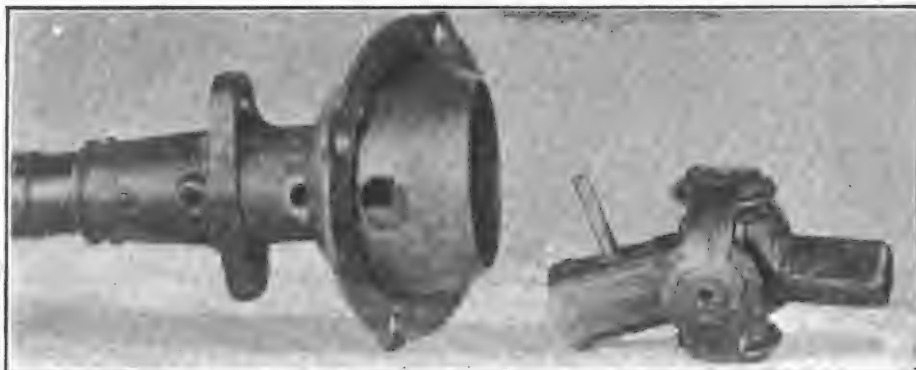


Transmission Drum Assembly Removed from Flywheel Shaft.

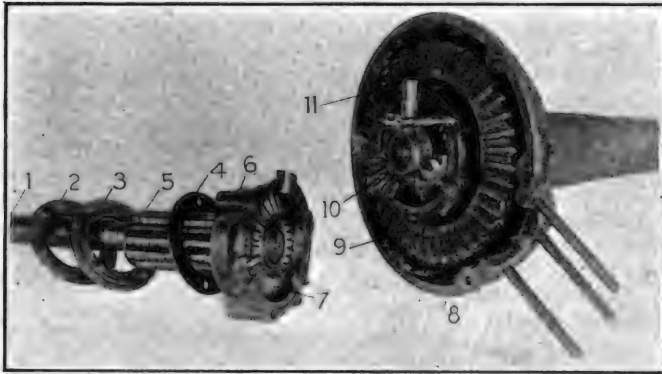
directed before. Next disconnect the rear drive member from the transmission gearset. This is done by removing the four bolts that hold the universal joint housing to the transmission gearset case. Next take out the bolts that hold the front radius rods in the socket underneath the crank case and remove the pans on either side of the cylinder casting.

Lifting from Chassis.

The engine is now supported and fastened to the frame at three points, in the front where the starting crank is located and at each side of the magneto. Pass a rope through the opening between the two middle cylinders and tie it to a hoist, which should be supported at the roof of the garage, then remove the bolts at the three points of suspension and the power plant may be lifted from the frame. If a hoist is not obtainable, pass a piece of 2 by 4 inch plank or an iron pipe about 10 feet long through the rope, and, with an assistant, by lifting on each end of the joist or pipe, and a third helper holding the starting crank handle, the power plant can be lifted from the car.



Universal Joint Removed from Housing and Ball Housing for Same.



Left Half of Rear Axle, Showing Differential Partially Disassembled: 1, Driving Shaft; 2, Outer Thrust Ring; 3, Middle Thrust Ring; 4, Inner Thrust Ring; 5, Inner Shaft Bearing; 6, Differential Gear Case; 7, Differential Gear; 8, Axle Housing; 9, Differential Spider; 10, Differential Pinion; 11, Master Gear.

The oil may now be drained from the crank case and the same order of repairs already directed for the engine in the chassis can be made.

With the power plant out of the car and the cylinder head removed, much of the work can be done with the engine "on its head" so to speak. First remove the bolts which hold the crank case to the engine block, then remove the bolts holding the transmission gearset, cover and crank case together. The cases may then be lifted apart, leaving the engine, magneto, gearset and clutch band assembly together.

Where no repairs are to be made on the engine and transmission case, the power plant may be removed without disturbing the base in the following manner:

After the radiator has been removed and other connections taken off, with the exception of the dashboard, as directed before, instead of removing the bolts at the three points of suspension, remove the bolts which fasten the engine block to the base and the bolts which fasten the gearset cover to the same base. After the gearset cover has been removed the power plant may be removed in the same way as before directed, except in this case, the engine and transmission base is left upon the car.

The flywheel and transmission gearset assembly may now be removed by cutting the wire which passes through the heads of the cap screws in the flywheel flange at the rear end of the crankshaft, and removing the screws. Slight difficulty might be encountered at this point because of the fact that in addition to the four cap screws the flywheel is fitted with two dowel pins, closely fitting in holes in the crankshaft flange. A few blows of the hammer against a piece of wood held against the flywheel will drive off the flywheel. This will leave the engine and transmission gearset in two units, which are more easily managed than as when assembled.

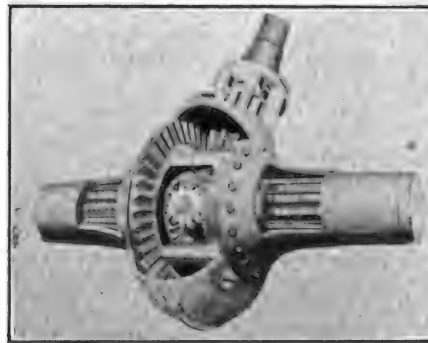
After the removal of the connecting rods and crankshaft bearing caps, the crankshaft may be lifted from the engine block, the main bearings examined, and, should replacement be necessary, the block with the crankshaft returned to the

factory or service station.

As a general rule the camshaft and bearings show but little wear, even after years of service. If, however, there is any play in the bearings, the camshaft may be removed as follows:

Remove the plate which is fitted to the front end of the engine block, which will expose the camshaft timing gear. If the gear shows signs of wear it may be removed by taking off the long camshaft gear lock nut. The gear may then be pulled from the shaft, as it is held from turning by two dowel pins.

After the two screws on the right side of the engine block that lock in the bearings have been taken out, the camshaft can be driven out of the engine block by placing a piece of hard wood or iron bar



Cut Away View of Differential and Centre of Rear Axle.

against the side on one of the cams and pounding it toward the front. This will drive out the camshaft, together with the gear and bearings.

The engine is the most important part of the car, and for this reason the greatest care should be observed in making the restoration and repairs. If there is the slightest play in any bearing or moving part it should be tightened. Where the part is worn so that the play can not be taken up, get a new part. The Babbitt bearings can only be replaced by experts or at service stations where there is proper equipment, and since the cost of such replacement is small, one should have it done rather than do it oneself. A

replacement that costs but little to make while the engine is disassembled, may amount to many dollars if left until the engine is put together again.

Before reassembling the engine, thoroughly clean and oil every part. Pay particular attention to the oil tube which carries the lubricants from the flywheel housing to the front of the crank case. Blow it out or run a wire through it.

Planetary Transmission Gearset.

The transmission gearset is a planetary type and may seem the most complicated part of the whole car. This article will not give an explanation of the operation of this unit, except that the speeds are obtained in two ways—the low speed forward, when the middle drum is held from turning by the band which surrounds it; the reverse, when the first or front drum is held. The last or back drum with the band constitutes the service brake.

The high speed clutch is located at the back and the exterior parts are the collar, spring and clutch fingers, all bolted to the outer part of the brake drum. This assembly may be removed without disturbing the arrangement by cutting the wire that passes through the heads of the cap screws which hold it to the brake drum and removing the screws.

The condition of the high speed clutch plates should be carefully noted. Many drivers have a habit of "slipping the clutch," which results in wear upon the clutch plates. Should the web of the brake drum show much wear where the master clutch plate engages it, the drum should be replaced.

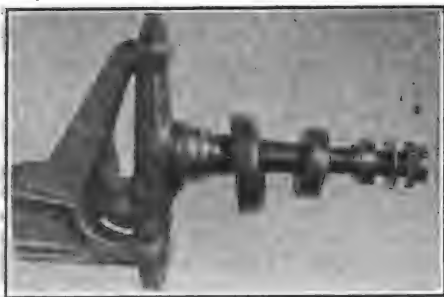
Removal of Clutch Parts.

The clutch disc drum on which are mounted 13 of the clutch plates must now be removed. This is held to the shaft by a lock nut, which must be loosened, and is kept from turning by a key. The clutch drum can be drawn from the shaft with a wheel puller, or a special puller designed for this purpose, which may be obtained at any repair shop or supply house.

After the clutch drum has been removed the three drums may be slipped from the shaft, pulling with them the three triple gears, which are mounted on



Testing a Vibrator Coil Which Has Been Removed from Box.



Front Wheel Spindle and its Fittings.

studs on the flywheel. Unless there is excessive play the gears are worn, or the drums badly scored, it is unnecessary to disassemble the drum assembly, which is held together simply by the outside or driving gear being forced on the brake drum shaft with a key to hold it from turning.

With the removal of this gear the drums can be drawn off. The parts of the gearset and their correct relationship are clearly shown in the picture.

Reassembling Transmission Gearset.

The reassembling of the transmission gearset is not a difficult matter if these directions are followed: First, place the brake drum on a box or table with the hub uppermost; upon it place the slow speed drum with gear uppermost, then the reverse drum with gear uppermost. After the two keys are put into place the driven gear may be forced into position with a mallet or piece of wood and a hammer. Next take the three triple gears and mesh them with the driven gear according to the punch marks on the teeth, the reverse gear or smallest of the triple gear assembly being downward. After making sure that the gears are all properly meshed, tie them in place by passing a cord around the outside of the three gears. If the flywheel is now placed face downward on the table the group may be inverted and put into position, each triple gear fitting on to a flywheel stud. The clutch drum may then be put into position, the clutch plates, with a large plate on both the extreme inside and outside, placed in the brake drum, one at a time, alternating with large and small discs until all are in place.

After the clutch and gearset have been reassembled, and the flywheel bolted to the crankshaft, the distance between the face of the magneto coils and permanent magnets should be carefully tested and adjusted. This distance should be equal to the thickness of an ordinary business card. Each coil, together with all the magnets, should be tested in order.

Before replacing the transmission gearset case the condition of the clutch bands should be noted, and should the fabric facing show wear it should be replaced.

Rear System Repairs.

The frame should next be supported upon jacks, horses or boxes, high enough to remove all weight from the rear axle. Next unfasten the brake rods and spring connections at the ends of the axle. The rear system may then be drawn from the car.

The radius rods, or rods which extend from the ends of the axle housing to the universal joint housing, should be removed, and the bolts which hold the drive shaft housing to the rear axle housing taken out. The drive shaft may then be taken from the axle.

The universal joint is removed from the shaft by driving the pin holding it to the shaft out of its seat. This can be done through a large hole in the ball housing surrounding the joint.

Since all of the drive of the car and all of the road strains are carried through this joint, it is subject to a great deal of wear. The replacement of this part is necessary if much wear or play is evident.

The pinion at the rear end of the drive shaft is held by key and a nut, which is locked by a cotter pin. Upon removal of the pin, nut and key, the pinion may be drawn from the shaft. Unless it be found necessary to replace either the pinion or the shaft, the pinion need not be taken off, since the gear and shaft may be slipped from the torque tube, permitting inspection or replacement of the roller bearing and race.

In every case where the exterior race or sleeve surrounding the roller bearing is removed, it should be replaced with a new one. This is essential because it is impossible to remove the sleeve without springing it out of line.

Rear Axle Disassembling.

To facilitate operation the rear axle should now be placed across two horses or boxes, wheel hub caps and the nuts and keys which hold the wheels to the shafts taken off, and the wheels removed. This will give access to the brake bands and brake cams. Upon removal of the steel and felt washers the roller bearings may be removed and examined.

Remove the seven bolts holding the central section of the rear axle housing together and the halves of the housing may be drawn off, leaving the differential gearset with the two axles on the horses or boxes. Make note that the drive or master gear is at the left side of the housing, facing the front of the car.

Until 1916 the axle housing was made with belled tubes riveted to the pressed steel central section. These rivets frequently loosened or sheared, weakening the housing. If this type axle is being overhauled, have the joint welded, which will completely restore it and insure against oil leakage.

The differential is disassembled by cutting the wire and removing the three nuts and bolts which hold the case halves together. This will expose to view the three differential pinions, as well as the two differential gears.

Carefully examine

the master gear bolts or rivets, as the case may be, and be sure that the gear is firm to the differential case.

The differential gears on the ends of the axle shafts are held either by a pin through the hub or by a split ring at the centre. The split rings may be removed by driving the gears back slightly. The pins, which are taper and riveted, may be filed and driven out with a nail punch.

Differential Repairs.

Should there be excessive play in any of the bearings or gears of the differential, repair is essential, since lost motion in this unit brings strain upon the gearset and engine when the car is started.

It should not be necessary to remove the front axle from the car. The front wheels may be taken off by removing the hub caps, the nuts on the spindles, the lock washers and the cones. The nut and cone on the right spindle are turned toward the right for removal since it is a so-called "left hand" nut. Those on the left side are right hand.

While the chassis frame is jacked is a good time to give the springs a thorough cleaning. Spring spreaders can be bought with which the spring leaves may be separated. A paste of graphite and oil should be placed between the leaves after the rust has been removed.

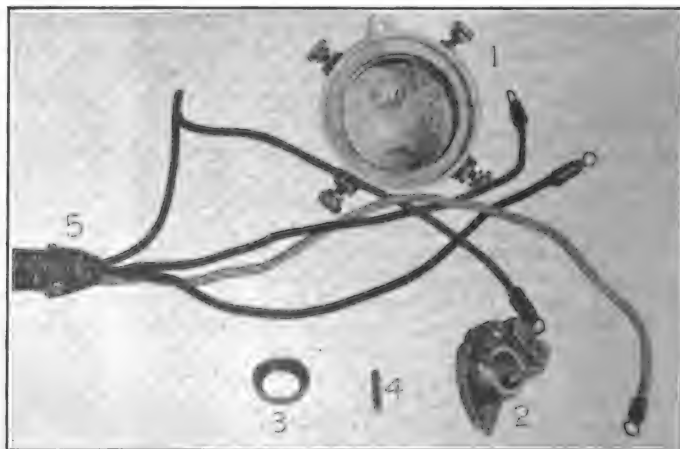
Disassembling Steering Gear.

In disassembling the steering gear the cap on top of the steering column and beneath the wheel is first unscrewed. The wheel and cap may then be pulled out, exposing the three planet gears mounted on the spider on the end of the steering post. After the ball arm is removed the steering post can be drawn up through the steering column.

Every part of the steering column should be carefully examined, the condition of the internal and planet gears noted and replacements made where there is evidence of wear.

A vital part of the steering mechanism is the wheel spindle assembly. After a car has been in service there is sure to be wear at these points. The spindle bolts usually should be replaced and the spindle bodies rebushed.

(Continued on Page 48.)



Timer Components Disassembled from the Camshaft and the Terminals of the Primary Wiring: 1, Timer Case; 2, Timer Brush; 3, Timer Brush Cap; 4, Brush Cap Pin; 5, Primary Cable and Terminals.

Production of the Eagle- Macomber Car

PRODUCTION of the Eagle-Macomber cars, made by the Eagle-Macomber Motor Car Co., Sandusky, O., is well under way, according to recent statements from the concern's representatives, a machine which offers a radical departure from the ordinary automobile design, in mechanical principle.

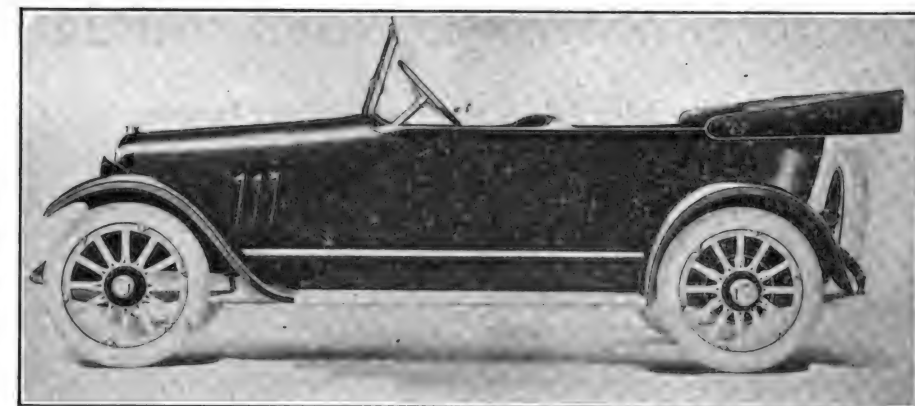
This is the first car to adopt the rotary engine as a means of power. This type of engine is practically new and though to a certain extent it operates upon the principle of a modern gasoline engine in that it is fitted with pistons, cylinders and connecting rods, the transmitted power is through a rotating disc, rather than a crankshaft as we know it.

The engine has five cylinders, which are fitted with copper cooling fins and bored to 3.75 inches. The head is formed in one block. This assembly is mounted on the drive shaft with the cylinders and shaft parallel and are connected with an angle or driving plate by means of the connecting rods.

The angle or driving plate is mounted at an angle on the drive shaft and the group of cylinders are also fixed on the drive shaft. The carburetor, which is a Zenith, automatic type, is mounted on the hollow shaft and the gas travels through ports into the cylinders through the usual poppet valve arrangement.

The operation of the engine can be more readily be seen by referring to the accompanying diagrammatic sketch of the principle operating parts.

The gas is drawn into and forced from the cylinders by the reciprocating action of the pistons, which are constructed



Eagle-Macomber Rotary Engine Five-Cylinder Touring Car with Wheelbase 118 inches; Priced at \$700.

similar to pistons of standard gasoline engines. When the piston reaches the top of its stroke, as shown at A, the mixture is fired and the expanding gas forces the piston toward the right end of the cylinder. The piston, through the connecting rod, pushes against plate D, and since this plate is rigidly fastened to the shaft and cannot tip, the force of expansion following the line of least resistance

to size. Owing to the simplicity of design it is possible to fit practically all of the moving engine parts with ball bearings, which are adjustable for wear. The timing gears are helical cut.

The Atwater-Kent ignition system is used, operating in the usual way through spark plugs into the cylinder heads.

The rear axle is of the full floating type the axle shaft, as well as the differential being mounted on Hyatt high duty roller bearings. The drive is through spiral bevel gears, the ring gear and driving pinion being of special nickel steel. The axle is reinforced with truss rod.

The front axle is of the one-piece, I beam section type, drop forged and special heat treated, having the wheels mounted upon ball bearings.

The wheels, which are of the artillery type, are of wood, 32 inches in diameter, and fitted with demountable rims

and 32x4 inch tires, non-skid on rear.

The springs are semi-elliptic on both front and rear. The front being 37½ inches long and the rear 52 inches long. Both sets are the same width—two inches.

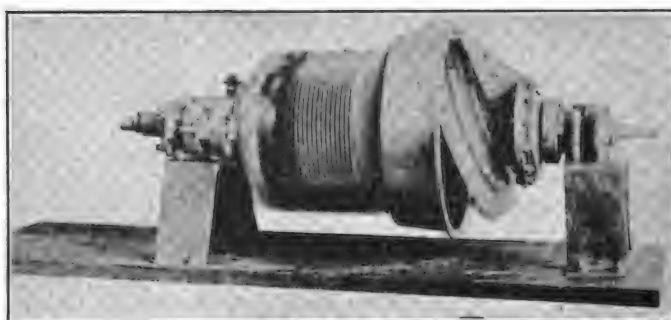
ROSS CHANGES MODEL TO SIX-CYLINDER.

The Ross Automobile Co., Detroit, Mich., will install a Continental six-cylinder engine, 3½x5½, in the new model Ross car instead of the eight-cylinder engine.

N. R. Wildman, a Cleveland banker, has been elected vice president of the company and will take charge of its affairs. H. D. W. MacKaye has been appointed general manager and C. W. Thompson will be sales manager. Other officials of the company are: Production manager, C. E. Banckard; purchasing agent, F. C. Gumpfer; treasurer, G. L. Ulrich.

CHANDLER NET EARNINGS.

The Chandler Motor Co. reports net earnings for the six months ending June 30 of \$1,574,000, which compares with \$863,000 for the same period in 1916.



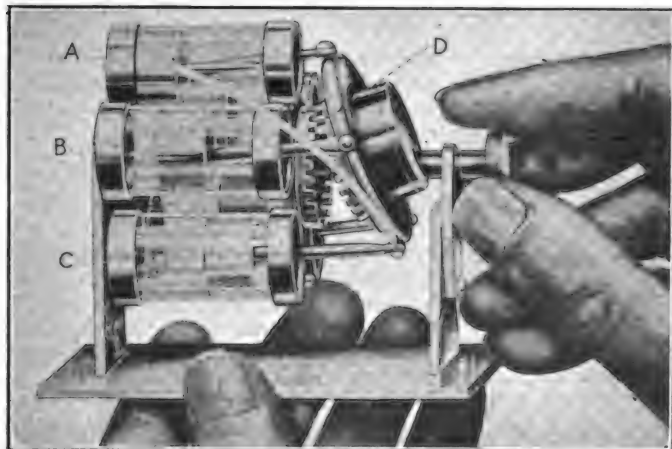
Sharply Detailed Photograph of Eagle Motor, After Five-Minute Exposure to Show Vibrationless Action.

forces the plate in the direction of the arrow.

After one-half a revolution the piston reaches the right end of the cylinder and occupies the relative position with the angle plate as indicated by letter C. Thus it will be seen the force of expansion revolves the angle plate and revolves one-half a revolution. The cylinders are also mounted on the shaft so that they also revolve, being kept in alignment by means of two gears.

As the angle plate continues to revolve the next half of the revolution brings the piston to the top of the exhaust stroke, and so on through each cycle.

According to the S. A. E. rating the engine furnishes 28.125 horsepower. The engine shaft is 2½ inches in diameter, carefully heat treated and ground



Model Showing the Principle of the Eagle-Macomber Motor; Cams, Wiring, Etc., Having Been Eliminated.

CLEAN GARAGE—LONGER CAR LIFE

Service Man Gives Suggestions to Owners Who Care For Their Own Automobiles

"No prospective owner hesitates to ask about the proper way to take care of his car," says the superintendent of Paige service. "But he frequently overlooks the matter of providing himself with the facilities to make such care easy. If a man looks after his car himself he should see to it that his home garage is a place of order and tidiness. A clean, well ordered, well equipped garage means longer life for the car.

"Owners frequently allow their cars to get into bad condition because the garage has been allowed to run down to such an extent that, to find any given article, a dozen and one other things have to be turned over or upside down, ending very often in a vain search and a ruffled temper.

"There should be a few shelves around the garage on which to place oil and grease tins, boxes for dusters, cotton waste, and the many other accessories which accumulate so quickly. All boxes should have a label outside, giving details of their contents.

"Several pieces of wood across the garage near the roof, or across one corner, will do to store away old outer covers and tubes until there are a sufficient number to send away.

"A work bench on which a vice can be fixed is invaluable if there is room for it.

"One of the most useful things in a garage is a tool rack. This is easily made and consists of a fairly thick board large enough to hold all the tools which are kept in the garage for general repairs as apart from those that are carried in the car.

"First of all, however, place the tools on a large piece of paper and arrange them so that they take up as little room as possible, although sufficient room should be left between each for you to be able to pick up any one without disturbing the one next to it. Put them into groups, keeping tools of the same kind together, ranging from the largest to the smallest.

"The best positions having been found, you will now know what size your board will be, but it is advisable to get one larger than you immediately require, so that new tools may be added as they are bought. The board procured, proceed to drive in nails, screws, staples or hooks on which to hang the tools.

"Now paint an outline of each implement on the board so that when a number of tools are removed at the same time you will be able to see at a glance exactly where they go when you wish to replace them.

"Another useful article is a chest of drawers in which to keep such things as washers, split pins and nuts. A convenient place for it is on a shelf, not too

high up. Any carpenter would make one for a small sum, but during the long evenings it is quite a pleasant occupation to make it yourself, particularly as it does not require many tools or an expert carpenter to carry out the job in a satisfactory manner.

"A handle placed on the top of the chest will enable it to be carried to wherever you may be working, in the same manner as the tool rack. It is very convenient to be able to do this, as it saves much walking about."

TO STOP AUTO THEIEVRY.

According to Secretary C. C. Kilbury of the Toledo Automobile Club, all of the makers, sellers and buyers of motor cars, together with the country's chemists and sellers of windshield glass, must combine against the auto thief if motor car thievery is to be abolished.

At the A. A. A. annual meeting Mr. Kilbury addressed the assemblage on the ever live and hard to be met problem of stamping out car thievery and presented a suggestion that calls for nation wide cooperation on the part of every person interested in eliminating the car thief.

Mr. Kilbury's idea is to place, by chemical process, the serial number of the car and the name of the owner's home town upon the windshield glass, and that each owner should carry a card bearing his name, address and the serial number of his car.

Identification marks upon the metal or wooden parts of the car may be removed or altered, but not so with those upon glass, which must be broken or removed. Hence a car with a plain or broken glass

would excite suspicion. The glass seller plays his part when he is asked to sell windshield glass to a man who cannot prove ownership of the car for which the purchase is made.

Mr. Kilbury admits that there are numerous arguments against this plan, and that to put it into operation would be a monumental task, but he states that present defects can be ironed out and asks that the plan be given discussion in the various auto clubs of the country.

SIX NEW BEARING SERVICE STATIONS.

The Bearing Service Co., Detroit, Mich., will open six new branches on Sept. 1. The new branches will be located at Pittsburg, St. Louis, Omaha, Portland, Oregon, New Orleans and Toronto, Canada, and will be in charge of C. M. Fox, C. R. Jones, W. C. L. Hodgson, R. H. Cross, W. R. Herring and A. W. Robbins, Jr., respectively. When these new branches are opened the Bearings Service company will have 22 branches, located in the principal cities of the country from coast to coast. These branches are now in operation in New York, Chicago, Philadelphia, Detroit, Rochester, Boston, Cleveland, Kansas City, Indianapolis, Denver, Dallas, San Francisco, Los Angeles, Seattle, Minneapolis and Atlanta.

These branches all act as service representatives for the Hyatt Roller Bearing Co., the Timken Roller Bearing Co. and the New Departure Manufacturing Co., and at each branch a stock of bearings of every size and description is carried for both cars of recent make, as well as for cars no longer manufactured.

MITCHELL DIVIDEND DECLARED.

The Mitchell Motors Co., Racine, Wis., has declared a regular quarterly dividend of \$1.50 a share, payable Aug. 24 to stockholders of record Aug. 10.



RACING CONTEST SCHEDULE.

Great Falls, Mont., track race....July 29
Billings, Mont., track race.....Aug. 5
Flomington, N. J., track race....Aug. 17
Uniontown, Pa., speedway race...Sept. 3
Cincinnati, O., speedway race, championship.....Sept. 3
Red Bank, N. J., track race.....Sept. 6
Pikes Peak, hill climb.....Sept. 8
Providence, R. I., speedway race, championship.....Sept. 15
Allentown, Pa., track race.....Sept. 22
Trenton, N. J., track race.....Sept. 28
New York, speedway race, championship.....Sept. 29
Danbury, Conn., track race.....Oct. 6
Uniontown, Pa., speedway race....Oct. 6

Richmond, Va., track race.....Oct. 13
Chicago, speedway race, championship.....Oct. 13
New York, speedway race.....Oct. 27

SHOW CALENDAR.

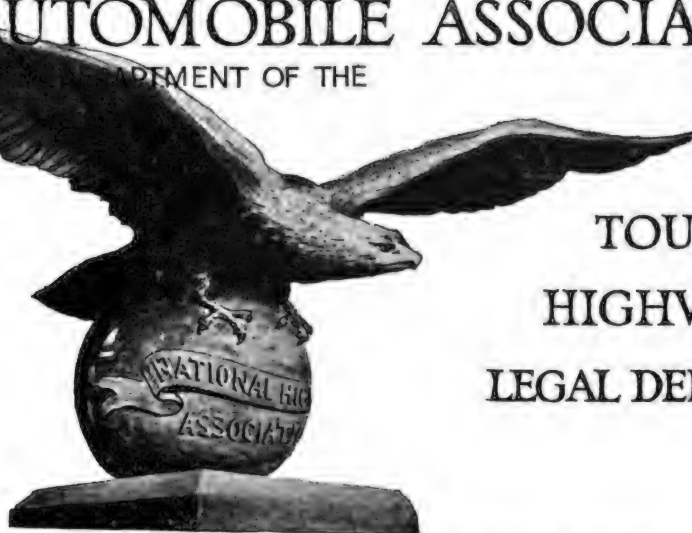
Fremont, Neb., tractor demonstration.....Aug. 6-10
Spokane, Wash., interstate fair..Sept. 2-9
Milwaukee Show, State Park Fair, West AllisSept. 9-15
Chicago, National Exposition of Ford Accessories, Coliseum.....Sept. 22-29
Dallas, Tex., Auto and Accessory Dealers' Association State Fair..Oct. 23-28
New York, National Automobile Show, Grand Central Palace..Jan. 5-12, 1918

OFFICIAL JOURNAL OF THE NATIONAL AUTOMOBILE ASSOCIATION

DEPARTMENT OF THE

NATIONAL
HIGHWAYS
ASSOCIATION

TOURING
HIGHWAY
LEGAL DEPTS.



9 PARK STREET, BOSTON, MASSACHUSETTS

Features of the New Maine Automobile Law

Towns Furnish Signs to Guide Speed Rate Change from 25 to 15
Miles—Important Provisions Regarding Official Acts and Traps

IN CONNECTION with the operation of traps in the State of Maine, it may be well for motorists to remember that the new automobile law for the State of Maine allows a speed of 25 miles an hour in the open country and 15 miles an hour in the built up portions, but that the speed must at all times be reasonable and safe; that traps must be one-half mile in length in the open country; and that in case of arrest for violation of law, officers cannot receive a fee for making an arrest, neither can they accept money or demand a bond or the appearance of the violator in court unless the person arrested is intoxicated, as he is authorized to accept the personal promise of the person arrested to appear in court and by failure of a non-resident to appear he forfeits his right to operate in the State of Maine.

DIGEST OF THE NEW MAINE AUTOMOBILE LAW.

In Force July, 1917.

Special Features of New Speed Law.

SPEED.

The legal rate of speed is 25 miles in the open country and 15 miles in the built-up portions. A built-up portion is the business section of a town or where the dwelling houses are less than 150 feet apart for a distance of at least one-quarter of a mile.

TOWNS MUST ERECT SIGNS.

Towns must erect signs showing where built-up portions begin and end, also within built-up portions the following sign, "Sign Limit, 15 Miles." Otherwise the speed limit is 25 miles.

DANGER SIGNS.

When by reason of cliffs, embankments or other exceptional natural conditions, which are dangerous, municipal officers

may erect the following sign, "Automobiles Go Slow," and the speed shall be reduced to five miles. It is illegal for municipal officers to erect signs except as above, and if there are such in existence it is the duty of the municipal officers to cause their removal.

SPEED MUST BE REASONABLE AND SAFE.

Speed must at all times be reasonable and safe, having regard to the traffic and use of the road by others, and in the thickly settled portion of a town or city where the traffic obstructs the operator's view of intersecting ways, crossings or corners, a speed exceeding eight miles is prima facie evidence of a speed that is greater than is reasonable and safe.

TRAPS MUST BE ONE-HALF MILE.

To violate the law in the open country the speed must exceed 25 miles per hour for a distance of at least one-half a mile; therefore, "traps" must be at least one-half a mile in length.

IMMEDIATE TRIAL.

Any person arrested for violating speed regulations except he is under the influence of intoxicating liquor, shall have an immediate trial if he demands it, and if it is impractical so to do the officers making the arrest must accept the personal recognizance of the person arrested to appear in court either in person or by counsel at a specified time not later than two days thereafter. Failure to appear in court at specified time forfeits operator's license and automobile registration. A non-resident failing to appear loses all right to operate in the state.

BONDS CANNOT BE DEMANDED.

Officers cannot receive a fee for making an arrest, neither can they accept any money or demand a bond unless the person arrested is intoxicated, but must accept the personal promise of the person arrested to appear in court.

INTOXICATED DRIVERS.

If any person in a reckless manner or while apparently under the influence of liquor, it is the duty of every officer and every citizen to report the same to the

secretary of state at Augusta, and he must investigate the complaint and has authority to suspend or revoke the license of the driver and registration of the vehicle.

LIGHTS.

Lights must be lighted between the hour after sunset and half hour before sunrise. When passing team, car must stop if occupant raises hand.

DIMMERS REQUIRED.

All automobiles are required to have dimmers or anti-glare devices on all lights.

MUFFLER CUTOFF, ETC.

No driver of motor vehicles shall open muffler cutoff within the limits of any city or town, or make any unnecessary noise. Penalty, fine not to exceed \$30 for each offense.

CONCEALING IDENTIFICATION MARKS.

A fine of \$200 is imposed on any driver of a motor vehicle who willfully conceals any marks of identification.

TEMPORARY REGISTRATION.

The secretary of state has authority to designate certain officers or persons in different parts of the state who shall have authority to issue temporary registrations good for seven days, the cost of which is \$1. These registration tags must be returned to the party issuing them within 10 days. Failure so to do lays the person liable to the same penalty as if he were driving a car without having it registered. The officer or person issuing the registration must report each week to the secretary of state the names of all persons who have received temporary licenses and not returned them within the 10 days after their issuance.

ANNUAL REGISTRATION FEE.

Cars of 15 horsepower or under.....	\$5
Cars from 15 horsepower to and including 35	10
Cars over 35 horsepower.....	15
Motor trucks (any power).....	10
Motorcycles	3
Manufacturers and dealers.....	25

A-L-A-M standard Year begins Jan. 1 and ends Dec. 31. Cars registered be-

tween Oct. 1 and Dec. 31 of any year, half regular fee. Secretary of state will replace lost plates at 75 cents each.

OPERATORS' LICENSE.

Operators must be licensed annually—fee \$2—but unlicensed persons may operate, when accompanied by licensed operator, if learning to operate and intending to apply for license. All licenses issued previous to Jan. 1, 1917, are void.

FIFTEEN-MILE ZONE.

A fee of \$2 is now required from all people touring in the State of Maine and persons living within the 15-mile zone in territory adjoining the boundaries of our state.

EXCHANGE OF CARS.

A car can be sold and another purchased of same power without extra fee by applying to secretary of state and paying \$2 for new number plates. If new car is of greater power there must be paid the difference between the first fee paid and the fee of the car of greater power. If before the first of August of each year a higher power car is exchanged for one of lower power, one-half of the difference is rebated. In each instance \$2 must be paid for new plates. When a car is sold secretary of state must be notified to whom sold.

The secretary of state has now the power to permit owners of new cars to make use of their old numbers in case the application is made personally at the office of the secretary of state.

MAY LOAN DEALER'S NUMBER.

Under the new laws passed by the last Legislature dealers are permitted to loan the dealer's number which has been attached to the car while held for sale to the purchaser of the same car for a period not to exceed five days.

NON-RESIDENTS.

Are allowed 30 days in the state without registering their cars provided operator is licensed and car registered in another state and number plates displayed. If they remain any longer they are required to pay same fee as residents.

The secretary of state, Augusta, Me., is the proper officer to apply to for registration or information.

ASSESSORS TO REPORT.

On or before the 15th of April of each year assessors must report to the secretary of state the name of all motor vehicle owners in their respective cities or towns.

POLICE ACTIVITIES.

CONCORD, N. H. We are advised that a squad of officers mounted on motorcycles and wearing plain kakhi uniforms are running along the main road between Concord, N. H., and Manchester, arresting all violators of the speed regulations. Caution should therefore be used not to exceed the speed limit in this locality.

BOSTON, MASS. There is a speed trap now being operated on Commonwealth avenue, between Massachusetts and Exeter streets.

WAYLAND, MASS. Police authorities of this town are vigorously enforcing the law requiring the sounding of signals at intersecting ways and special attention is being given to all violations where the state highway crosses Cochuate road, over which thousands of motor vehicles daily pass. A number of arrests have been made.

SHREWSBURY, MASS. A great deal of complaint is being made against fast driving of automobiles upon Shrewsbury street, on the main highway into Worcester, especially at the junction of Walte street. Officers are stationed and are stopping and arresting motorists for violations of the speed law and also traffic regulations.

AYER, MASS. A trap has been established and is being operated on the state highway near the new United States Armory cantonment.

GLOUCESTER, MASS. Owing to a new ordinance of this city automobiles are now permitted to park on Maine street for only 20 minutes, instead of one-half an hour as formerly.

ARLINGTON, MASS. A trap on Massachusetts avenue, between Trowbridge street and Lake street, will be operated indefinitely for all offenses against the traffic laws. We suggest that motorists not only carry their registration and license certificates, but be sure that their name is written on their license, as required by law.

WOONSOCKET, R. I. Owing to considerable complaint against fast driving the police department are now enforcing the traffic regulations. Policemen in plain clothes are stationed at various places in the state and all drivers violating the traffic ordinance will be held up and they will be ordered to report to the chief of police at headquarters.

BOSTON, MASS. Considerable complaint is also being made against fast driving between Park and Boylston streets, on Tremont street.

PAWTUCKET, R. I. Town counsel has ordered the town engineer to lay traps on the avenue from the Pawtucket line to Riverside in an endeavor to put a stop to speeding by automobiles. The state law provides that an automobile must not exceed 15 miles an hour in closely built up sections and motorists may henceforth expect a strict enforcement of the law.

ARLINGTON, MASS. Traps are also being operated on Swan street, the main highway connecting Arlington with Winchester.

PORTLAND, ME. Special attention is called to the traps which are being operated upon the state highway in Scarborough and in South Portland, Me., on the main highway between Portsmouth and Portland. A number of arrests have been made and heavy fines have been imposed by the municipal court of Portland.

Motor cyclists are operating upon this highway and from the experience of one of our members, who resides in Massachusetts, special emphasis is placed upon the violations of law by non-residents of Maine. One Massachusetts resident, alleged to be traveling between 30 and 35 miles an hour was fined \$20, while a Maine motorist, traveling at 40 miles, was fined but \$10.

We would suggest special care on the part of a non-resident motorist traveling up the highways of Maine and especially in this particular locality.

PLYMOUTH, MASS. The police of this town have established several traps and will strictly enforce the speed laws, the law requiring the slowing down at corners and giving a timely signal, as well as the eight foot rule with respect to approaching street cars which have stopped to take on or let off passengers.

UXBRIDGE, MASS. A special motorcycle policeman has been assigned to

stop and arrest speeding motorists driving through the principal streets of this town.

FALL RIVER, MASS. Owing to a number of automobile accidents and an increasing number of complaints against fast driving, the police authorities of this city have detailed a squad of officers in plain clothes and uniforms to hold up and arrest all violators. Rock street, near the city stables, as well as other locations, is being closely watched.

LOWELL, MASS. The following intersections of streets are deemed dangerous places by the police authorities of this city, and every precaution should be taken by motorists in driving through them in order to avoid arrest for over-speeding or carelessness.

The intersection of Westford and Smith streets, Gorham and Locke streets and Atkin and Moody streets.

MANCHESTER, N. H. The traffic rules of this city prohibit the stopping and leaving of automobiles unattended for over five minutes on Main street.

Traffic officers are regularly stationed and are strictly enforcing the motor vehicle laws at Central and Elm streets—which is the transfer station—and Hanover and Elm streets—north of Main street. During the noon hour and supper hour from six to seven, traffic officers are stationed at Clapp's corner, West Main, Chester and also at Amory and Main streets—in what is known as McGregorville—now Notre Dame, and at Bridge and Elm streets.

REVERE, MASS. Until Labor Day, Saturday afternoons, Sundays and all holidays, the boulevard from Eliot circle to Revere street is closed to auto traffic from 2 p. m. until 11 p. m. Such being the case the traffic going north will be diverted through Ocean avenue to Revere street, Ocean avenue to be a one-way street. On these days traffic officers are on duty on Ocean avenue. Traffic going south will be diverted upon Revere street, on to Broadway, continuing to the boulevard again.

Traffic going to Lynn, Mass., and places below this point would find better roadbed and not so much congestion, as well as make better time, by leaving the boulevard at Broadway, Revere, continuing through Broadway to West Lynn over the state highways, over the Lynn marshes, then striking off onto the boulevard again at West Lynn.

The rate of speed through Broadway, Revere, should not exceed 15 to 18 miles per hour.

LEOMINSTER, MASS. Complaints are being made against fast driving of motor cars on Main and Central streets and failure to go beyond the centre of the intersecting street going south to Monument square.

SPRINGFIELD, MASS. The police authorities of this city wish the attention of motorists called to the fact that the main business street is very much congested practically all the time between the railroad arch and State street, and it is suggested that motorists would relieve this congestion somewhat by using parallel streets while traveling north and south.



New York City's Latest Traffic Regulations

New Police Department Regulations Define Highways, Designate One-Way Streets, and the Respective Duties of Drivers and Pedestrians

The following are the latest regulations for street traffic, issued by the police department of the city of New York:

Definitions.

(a) The term "street" shall apply to that part of a public highway intended for vehicles.

(b) The term "one-way traffic" street shall apply to a street when and where vehicular traffic is restricted to one direction.

(c) The term "curb" shall apply to the boundaries of a street.

(d) The term "horse" shall apply to any draft animal or beast of burden.

(e) The term "vehicle" shall apply to a horse, and to any conveyance, except a baby carriage.

(f) The term "street car" shall apply to any conveyance confined to tracks.

(g) The term "driver" shall apply to the rider, driver or leader of a horse, to a person who pushes, draws, propels, operates, or who is in charge of a vehicle.

(h) The term "parked" shall apply to a waiting vehicle and to waiting vehicles drawn up along side of one another not parallel to the curb.

Respective Duties of Driver and Pedestrians.

(a) Streets are primarily intended for vehicles, but drivers must exercise all possible care not to injure pedestrians.

(b) Pedestrians:—First, avoid interference with vehicular traffic and to this end not step from the sidewalk without first looking to see what is approaching; second, cross the street at a right angle, preferably at a cross walk and where a traffic policeman is stationed, wait for his signals; third, stand on the sidewalk or close to the track when waiting for a car; fourth, face the front of the car when alighting and observe the traffic on

the right before moving to the sidewalk, and if passing behind the car observe the traffic in both directions.

(c) Pedestrians should keep to the right and not stop so as to obstruct a sidewalk or cross walk or an entrance to a building.

(d) Pedestrians on streets with narrow sidewalks should use the sidewalk on their right.

The following regulations for vehicles shall be observed by the drivers thereof, who shall also comply at all times with any direction by voice, hand or whistle from any member of the police force as to starting, stopping, slowing, approaching or departing from any place, the manner of taking up or setting down passengers and the loading or unloading of anything.

Police officers may temporarily divert traffic to avoid congestion.

Article I. Passing, turning, keeping to the right, backing and following.

Section 1. A vehicle meeting another shall pass to the right.

Section 2. A vehicle overtaking another shall pass to the left and not pull over to the right until entirely clear of it; except in passing a street car, when it shall keep to the right if distance between car and curb permits.

Section 3. A vehicle turning into a street to the right shall turn the corner as near the right hand curb as practicable.

Section 4. A vehicle turning into a street to the left shall pass around the point of intersection of the two streets.

Section 5. A vehicle turning from one side to the other of a street shall do so.

Section 6. A vehicle shall keep as near as practicable to the right hand curb so as to leave the centre of the street clear for overtaking traffic—the slower the speed the nearer the curb.

Section 7. A vehicle on a street divided longitudinally by a parkway, walk, sunkenway, viaduct, isle of safety, or cab stand, shall keep to the right of such division.

Section 8. A vehicle passing around a circle shall keep to the right from entrance to exit.

Section 9. A vehicle shall not back to make a turn if it obstructs traffic, but shall go around the block or to a street wide and clear enough for the purpose.

Section 10. A vehicle shall not follow another too closely for safety.

Article II. Stopping, standing, waiting and parking.

Section 1. A vehicle shall not stop with its left side to the curb except on a "one-way traffic" street.

Section 2. A vehicle waiting at the curb shall promptly give way to a vehicle arriving to take up or set down passengers.

Section 3. A vehicle shall not be left in such position as to prevent another from moving up parallel and close to the curb in front of an entrance to a building, nor so as to prevent another already stopped near the curb from moving away, nor within 10 feet of a fire hydrant.

Section 4. A vehicle shall not be parked or otherwise stopped so as to prevent the free passage of other vehicles in both directions at the same time or in one direction in a "one-way traffic" street.

Section 5. A vehicle, unless parked, shall not stand backed up at any angle to a curb, except while actually loading or unloading, and if horse drawn and with four wheels the horses shall stand parallel with the curb, faced in the direction of traffic.

Section 6. A vehicle, unless a street car, shall not stop in any street except near the curb and then so as not to obstruct a crossing or cross walk, except to allow another vehicle or pedestrian to cross its path.

Section 7. A street car shall not stop within an intersection of streets nor within five feet of a street car ahead, nor so as to obstruct a cross walk.

Article III. Overtaking street cars.

A vehicle in overtaking or meeting a street passenger car which has been stopped for the purpose of receiving or discharging passengers, shall not pass or approach within eight (8) feet of such car so long as such car is stopped.

Article IV. Right of way.

Section 1. When in the performance of

duty, the following vehicles shall have the right of way: U. S. mail, police, fire, fire patrol, bureau of buildings, emergency repair of public service corporations, ambulances; also the military.

Section 2. Conditions warranting, north and south traffic shall have the right of way.

Section 3. A vehicle in front of a street car shall immediately turn out upon signal.

Section 4. A vehicle shall not so occupy any street as to obstruct traffic.

Section 5. A vehicle, on the approach of fire apparatus, shall immediately draw parallel and near to the curb and stop.

Section 6. A street car, on the approach of fire apparatus, shall stop so as not to interfere with its passage.

Article V. Signals.

Section 1. A vehicle driver when slowing or stopping shall give timely signal by hand or whip, or in some other unmistakable manner.

Section 2. A vehicle driver when about to turn either from a stand still or while in motion, shall give timely signal by hand or whip or in some other unmistakable manner to indicate the direction of the turn. This is especially important when turning to the left.

Section 3. A vehicle before backing shall give ample warning.

Section 4. Police whistle signals shall indicate:

One blast—North and south traffic stops and east and west proceeds.

Two blasts—East and west traffic stops and north and south proceeds.

Three or more blasts—The approach of fire apparatus or other danger.

Section 5. A vehicle shall be equipped with lights and sound signals as prescribed by law.

Section 6. Sound signals are prohibited except for necessary warning.

Article VI. Speed.

Section 1. A vehicle shall not exceed the rate of speed established by the law and shall proceed with great caution, especially in making turns in crossings, other streets and cross walks, and in passing other vehicles.

Section 2. A vehicle shall not cross sidewalk to or from an alley, lot or building faster than a horse walks.

Article VII. Restrictions in regard to vehicles.

Section 1. The use of a vehicle is prohibited when it is so constructed, enclosed, equipped or loaded as to be dangerous, retard traffic, or prevent the driver from having a view sufficient for safety.

Section 2. The use of a vehicle is prohibited when it is so loaded with iron or other material as to create loud noises while in transit.

Section 3. A vehicle when loaded with any material extending beyond its rear shall be provided with a red flag by day and a red light at night on the extreme rear end of such load.

Section 4. No one less than 16 years of age shall drive a vehicle intended for commercial purposes.

Section 5. No one shall ride upon the rear of a vehicle without the driver's consent, nor with any part of his body protruding.

Section 6. A vehicle unless confined to tracks shall not tow more than one other vehicle and the connection shall be not longer than 16 feet.

Section 7. Coasting is prohibited when dangerous.

Section 8. The use of a motor muffler cut out is prohibited.

Section 9. Dense smoke from motors is prohibited.

Article VIII. Control, treatment and condition of horses.

Section 1. A horse shall not be unbridled nor left unattended in a street or unenclosed space without being securely fastened, unless harnessed to a vehicle with wheels so secured as to prevent its being dragged faster than a walk.

Section 2. A driver shall continuously hold the reins in his hands while riding, driving or leading a horse.

Section 3. No one shall overload, overdrive, override, ill treat or unnecessarily whip any horse.

Section 4. No one shall crack or so use a whip as to excite any horse other than that which he is using, or so as to annoy, interfere with or endanger any person.

Section 5. No one shall use a horse unless it is fit for its work, free from lameness or sores likely to cause pain, and from any vice or disease likely to cause accident, injury or infection.

One-Way Traffic Streets.

Nassau street, Spruce to Wall streets, south bound.

Cortlandt street, Broadway to Greenwich streets, west bound.

Dey street, Greenwich street to Broadway, east bound.

Greenwich street, Vesey to Franklin streets, north bound.

Washington street, Vesey to Franklin streets, south bound.

Mail street, Park Row to Broadway, west bound.

Centre street, Tryon Row to Broadway, south bound.

Thomas street, Hudson street to Broadway, east bound.

Leonard street, Broadway to Hudson street, west bound.

Franklin street, West Broadway to Broadway, east bound.

White street, Broadway to West Broadway, west bound.

Park Row, Mail street to Broadway, north bound.

Crosby street, Howard to Bleacher streets, south bound.

Prince street, Macdougall to Lafayette streets, east bound.

Houston street, Lafayette to Macdougall streets, west bound.

Cleveland Place, Broome to Spring streets, north bound.

Fourteenth street, Fourth avenue to University place, west bound.

Broadway, 22nd to 23rd streets, west bound.

Twenty-second street, Fifth to Sixth avenues, north bound.

Thirty-third street, Fifth to Seventh avenues, west bound.

Sixth avenue, 33rd to 32nd streets, south bound.

Sixth avenue, 34th to 35th streets, north bound.

Broadway, 15th to 34th streets, south bound.

Forty-third street, Vanderbilt to Madison avenue, west bound.

Seventh avenue, 46th to 47th streets, north bound.

Amsterdam avenue, 71st to 70th streets, north bound.

Amsterdam avenue, 72nd to 73rd streets, north bound.

West End avenue, 107th to 106th streets, south bound.

Columbus avenue, 63rd to 64th streets, south bound.

Twenty-sixth street, Broadway to Fourth avenue, east bound.

Twenty-seventh street, Fourth avenue to Broadway, west bound.

Thirty-first street, Fifth to Seventh avenues, west bound.

Thirty-second street, Seventh to Fifth avenues, east bound.

Twenty-eighth street, Lexington to Eighth avenues, east bound.

Twenty-ninth street, Lexington to Eighth avenues, west bound.

One-Way Streets One-Half Hour Before Commencement and One-Half Hour After Termination of Theatre Performances.

Thirty-ninth street, 69th avenue to Broadway, west bound.

Forty-third street, Broadway to Sixth avenue, east bound.

Forty-fourth street, Sixth avenue to Broadway, west bound.

Broadway, 42nd and 43rd streets, north bound.

Forty-eighth street, Sixth to Seventh avenues, west bound.

Special Regulations in the Borough of Manhattan.

Fifth avenue from 26th street to 58th street during the time semaphore

stanchions are on the street.

(1) Either turn right and go around the block, or

(2) Form line in centre of roadway back of cross walk and wait for officer's signal, and then pass in front of, instead of around the semaphore stanchion.

Manhattan entrance to Brooklyn Bridge—All vehicles are prohibited from moving in a northerly or southerly direction on Broadway between 13th and 14th streets between 8:30 a. m. and 6:30 p. m., except those having business on that block.

Twenty-third street, between Broadway and Fifth avenue—All vehicular traffic is prohibited on 23rd street between Broadway and Fifth avenue.

Times Square—All vehicular traffic is prohibited from moving in an easterly or westerly direction on Times square at 45th street.

Central Park West, 60th to 110th streets—Vehicles are permitted to move in a northerly and southerly direction on the westerly side of Central Park West.

Parking Spaces for Vehicles.

West street, Rector to Cortlandt streets, two lines along outer edge of Marginal way, facing south.

West street, Christopher to Gansevoort streets, two lines along outer edge of Marginal way, facing south.

Twelfth avenue, 24th to 30th streets, two lines along outer edge of Marginal way, facing south.

Fifty-seventh street, Eighth to 10th avenues, two lines, centre of street, facing west.

Seventeenth street (south side), Fourth avenue to Broadway, inside of stanchions, facing west.

Fourth avenue (west side) 16th to 17th streets, backed up diagonally to park curb, facing in direction of traffic.

Fourth avenue (west side), just north of 14th street, backed up around monument.

Borough of Brooklyn.

One Way Traffic Streets.

Fulton street, Willoughby street to Myrtle avenue, north bound.

Broadway, Roebling to Havemyer streets, west bound.

Special Regulations in the Borough of Brooklyn.

Fulton street, from Court square to Bond street—No vehicle proceeding in either direction on Fulton street from Court square to Bond street shall cross from one side of Fulton street to the other, except at street intersections.

Long Island Railroad Depot, Flatbush avenue—All vehicular traffic is prohibited on Flatbush avenue between Fourth and Atlantic avenues, in front of the Long Island Railroad Depot.

Atlantic avenue, from Atlantic to Fifth avenues—Vehicles are permitted to proceed north and south on the westerly side of Atlantic avenue from Washington to Fifth avenues.

Prospect Park West, from Union street to 15th street—Vehicles are permitted to proceed north and south on the westerly side of Prospect Park, west from Union street to 15th street.

Ocean avenue, from Flatbush avenue to Parkside avenue—Vehicles are permitted to proceed north and south on the easterly side of Ocean avenue from Flatbush to Parkside avenues.

Parkside avenue from Ocean avenue to Coney Island avenue—Vehicles are permitted to proceed east and west on the southerly side of Parkside avenue from Ocean avenue to Coney Island avenue.

Borough of Queens.

One-Way Traffic Streets.

South street, Broadway to Central avenue, Far Rockaway, east bound.

Central avenue, Norton avenue to South street, Far Rockaway, south bound.

Special regulations in the Borough of Queens—All vehicular traffic is prohibited on Jackson avenue between Skillman place and Diagonal street.

These regulations do not apply to U. S. mail, police, fire, fire patrol, bureau of buildings, emergency repair vehicles, ambulances, military and vehicles which run only on rails or tracks.

New Series of Chevrolet Is Disclosed

TWO new enclosed cars are announced with the new series of Chevrolet cars for 1918. These are the Four-Ninety Sedan and the Chevrolet Sedan Model F-A.

The Four-Ninety Sedan has been built to fill the demand for a car that was neither too low in price to allow for the necessary detail or too expensive to be above the average purse in price. This car is mounted on the regular stock four-ninety chassis, which is standard.

The body is neat in appearance and built upon accepted lines. Entrance is gained to the driver's seat by a door at the left and to the rest of the car through a single door at the right opening into the tonneau. Owing to the fact that the front right seat can be tipped forward, entrance is facilitated.

Attractive Body Refinements.

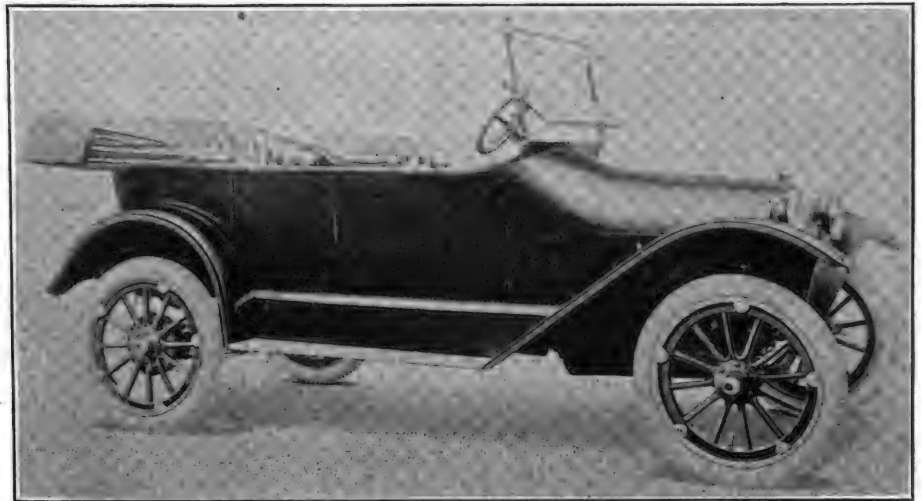
It is of the five-passenger type with divided front seats and deep, roomy tonneau, attractively upholstered in a fine grade of gray cloth carefully finished with whipcord binding.

The windshield is of the water tight style of the three-piece type, and includes a rubber weather strip between the two vertical sections. The lower section is fitted with a hidden trunnion hinge, allowing it to be moved in any position desired.

For winter driving all windows may be closed, making the body tight and warm. For summer driving the side windows may be dropped into pockets, disappearing in the sides of the car, with the exception of the two rear windows, which drop down as far the wheel housing, and may be taken out if desired and carried in a receptacle located in the back of the rear seat.

Dome Light in the Top.

The top, which is graceful in lines, is fitted with a dome light, which is operated from the storage battery. The



Chevrolet New Series Four-Ninety Touring Car with 102-Inch Wheelbase, Which Sells at \$635 F. O. B.

back window is fitted with a silk curtain, and both doors are equipped with locking devices, the left being locked from the inside, and the right from the outside of the door.

The Chevrolet Sedan Model F-A is mounted on the regular Baby Grand and Royal Mail model chassis and like the Four-Ninety Sedan is really two cars in one; the closed model for winter driving, the open for the summer.

The general body arrangement, the opening and closing of the windows and divided front seat design of the Model F-A is the same as the Four-Ninety Sedan. The high quality of workmanship is held to in this model. The body is more roomy and as in the smaller sedan there are places provided for the stowing of windows and posts.

The Eight-Cylinder Car.

The former line, consisting of the touring car and the eight-cylinder car, are still being included in production. Though the former chassis has suffered a number of changes the latter or eight-cylinder car is practically the same.

The four-ninety engine and chassis have been improved to a great extent in the new design. The engine is lubricated by a positive gear pump rather than the former type of plunger. In addition, a new oil pressure gauge has been mounted on the instrument board.

The cooling system, which formerly

was by thermo-syphon, has been changed to pump system. The radiator size has been increased.

The wheels are now fitted with demountable rims and one extra is furnished with the standard equipment. A slight change is to be noted in the fender arrangement in that the front mudguards are joined to the radiator guard.

BOOM LOUISVILLE FOR AUTOMOBILE FACTORY.

The Louisville (Ky.) Industrial Foundation, which has a million dollar factory fund, has appointed a special committee to prepare a brief on Louisville as an automobile manufacturing centre and to make a special effort to secure large automobile factory to locate there.

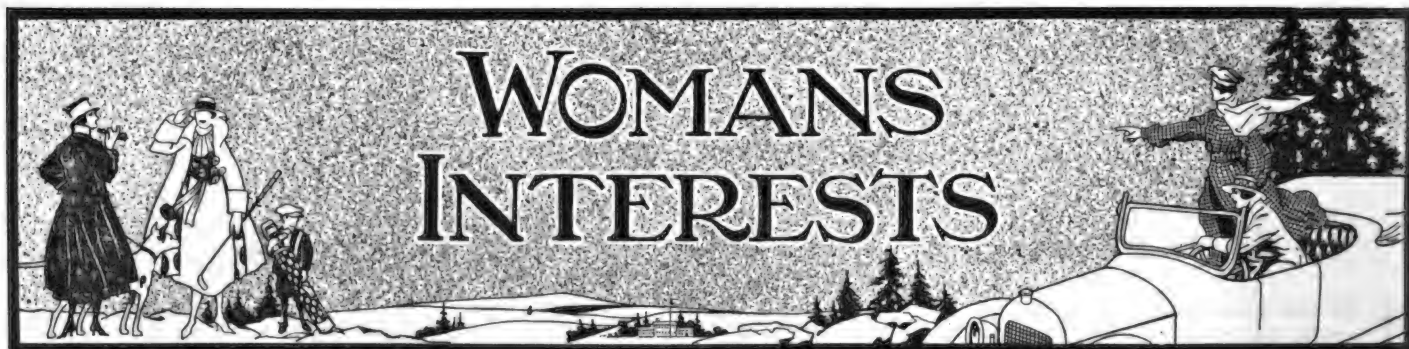
The Ford Motor Company recently established an assembling plant in Louisville and the Dixie Motor Car Company, which is capitalized for \$400,000, is being successfully operated in that city.

CUT ASSESSMENT ON STUDEBAKER ESTATE.

The township assessors of South Bend, Ind., assessed the estate of the late J. M. Studebaker at \$2,170,980, as compared with only \$14,000 last year, but on protest of the Studebaker corporation officials the county tax reviewers reduced the appraisement to \$250,000.



Chevrolet F-A Sedan; Priced \$1475. Receptacle for Side Door Posts. Chevrolet Four-Ninety Sedan; Priced \$1090.



The Smart Tailored Wear of Motordom

In Motor Millinery, Swagger Hats Take on Patriotic Colors and Military Names, One Even Being Called the Pershing

By Mrs. A. Sherman Hitchcock

MOTOR women have less anxiety than formerly in the preparation of their wardrobe, for never were motor garments more attractive than they are this season. All the smart shops now cater to the needs of the motorist and they are cooperating with the designers and manufacturers, so that it is a very simple thing for the motor woman to make her selections, either from the ready made garments to be found or from the materials kept by the shops.

In motor millinery I find some of the most swagger little hats of tricot de laine—otherwise known as knitted woolen yarn—in the newest and most approved colors, such as field mouse, Liberty blue, West Point, French briar, Pershing, redwood and sable. These hats are very simply trimmed with ribbon. The knitted yarn, like straw, is fashioned into a sort of braid which is sewed to chic little shapes, and the motor hats thus evolved are really the jauntiest little affairs imaginable. Not only are entire hats made of this woolen braid, but hats of other materials are trimmed with it. Very attractive for motoring is a small hat of platinum gray moon-glo satin edged with coral woolen braid. The crown is banded with the braid and there are two tassels at one side, which are frayed out of the braid. Another decidedly smart motor hat is made entirely of narrow American Beauty ribbon, combined with torpedo gray ribbon. Some very smart motor hats of leather are also shown, while the hat of cravenetted silk is very practical, especially for the tourist, as it is both rain and dust resisting. Oilskin jockey caps for women motorists have a long peak and a rather full crown and are absolutely rain proof.

Attractive Motoring Vells.

There are some very attractive new vells and I am particularly pleased with the "Po-Lo," which is of exceptional quality and make. The veil proper is white chiffon cloth and has a hemstitched border about three inches wide which is

finished with a picot edge. The border is striped in emerald and white, Alice and white, old rose and white and navy and white. Another attractive veil just brought out by a leading designer is the "Koo-Koo," and comes in very smart combinations, such as Nile with mignotte border, wistaria with purple, mignotte with peach, black with white and many others. Still another is the "Star" veil, a voluminous affair of chiffon cloth ornamented with embroidered stars. It is made in a large variety of solid colors and also lovely combinations. These particular vells are practical, serviceable and most attractive. They will stand many washings and look as good as new. They may be turned over the face and the long ends twisted around the throat and carried to the back. They make a delightful gift for the motor woman's birthday and are always very acceptable.

To Protect Against Chills.

The new Worumbo wool coats are thoroughly comfortable for this season of the year, for even in August, after the sun goes down, it is quite often really chilly in a rapidly moving car. They are so light in weight and soft of texture, because of their blanketlike, woolly quality, that they are not in the least cumbersome to carry or lift about. The advance models well deserve the attention of the motor woman.

The "Poilu" cloth coats are among the leaders. "Poilu" is named after the French soldiers and has a rough finished surface and comes in a number of most attractive colors for wear in the motor. Taupe, leather, furlough red, blue militaire, field mouse and citron are smart. A model shown me is of citron green Poilu, built on loose raglan lines, with sleeves in one with the body of the garment and a shapeless straight fall from shoulders to foot, so cleverly arranged in the cutting that graceful lines are given and comfort is assured. The collar, cuffs and belt were of the Hilledale wool in a checkerboard design

of black and citron. The high, choker stock collar is a feature of new motor coats and certainly looks much better than the turn down collar for motor wear and is also more protective. It possesses quite a military air, with its dashing uniform like effect.

Some on Military Lines.

Among the newest arrivals are the "Coat front capes," and as the name implies, are built with a front which is coat in effect and a back in cape effect. The sides are usually slit for the arms to pass through, while other models are so fashioned that the arms are easily slipped through the space between the coat front and cape back. Many have belts on the slip through double strap order. There is no material more excellently adapted for the cape coat than Nanken. This Worumbo wool possesses the beauty of glove skin, Cachemire velour and broadcloth combined. It is of so unusual and beautiful a texture that it could be correctly termed a composite of the most charming of wools, possessing a kid like finish, a depth of velour and the finest of textures. In the lovely aqua color with a lining of canary satin, no coat cape could excel it. Motor capes have come to stay, without a doubt, and the majority have a very swagger, military dash about them that renders them picturesque and pleasing, beside giving the finest protection imaginable. They are so easily donned and doffed and may be worn over the coat suit or sweater, and even over another coat of lighter weight.

Cool Summery Coats.

Coats and suits of silverbloom are the epitome of coolness and summeriness and this desirable material launders well and easily, which makes it especially appropriate for motor wear. Coats of silverbloom, lined with contrasting color, are very attractive for wear over summery frocks on short trips to a country club or any other wear of this kind. They are also just as suitable for long, dusty tours through the country. Modish suits

Motor hat of cravenetted silk, a material which is rain and dust resisting and therefore ideal for the motoring tourist. As attractive a model and effective in its particular line of service to the motorist as any that has heretofore appeared in this particular department of the Automobile Journal.



The motor woman at the beach can wear no more appropriate or attractive suit than this one of silverbloom. Sand color forms the suit and the trimmings are of striped silverbloom in sand and green.

Every motor woman should possess one of the new Folsomkote Raynsters, which are both practical and attractive. The circular collar is convertible into funnel style. These coats are absolutely water proof and dust proof and are both comfortable and light in weight.



Charming motor frock of the new presidio moon-glo meteor made in the straight line silhouette so much favored at present. This beautiful and durable material requires no other trimming than the hemstitching with which it is decorated.



Courtesy Franklin Simon & Co., New York City.

When the littlest girl goes a motoring here is the coat that is appropriate for her to wear. Black and white checked worsted, or navy blue and white, with detachable white pique collar and cuffs. Motor hat of navy blue straw trimmed with ribbon and ornament in coral color.



Motor frock of white washable satin, with cluster tucked blouse, turned back cuffs, pleated skirt with wide tucks and trimmed with pearl buttons. This frock may also be had in navy and black. Courtesy Franklin Simon & Co., New York City.

for the motor woman to wear are made of a combination of plain and striped silverbloom and are very effective and smart. A hat and parasol of the same material is favored by smart dressers. The umbrella shops will mount a parasol at a very nominal price. The material is so exceptional, in that it does not muss, is durable, launders perfectly, and is guaranteed not to shrink or fade. What more could the motorist desire for her use?

Military Cast Sweaters.

All the military colors are in evidence in the new fall sweaters. There are moderately short and very short, long and very long, the slip on variety and the one which buttons down the front. Clever new ideas in girdles, pockets, collars and cuffs give them individuality. The olive drab of the aviation corps, the blue gray of the French military staff and the khaki of the United States army are decidedly smart for the motor sweater.

A sweater in plain color has a deep band of bright Roman stripe around the bottom and cuffs of the stripe, while a high military collar of the bright colors is wonderfully effective. The thinnest of Shetland sweaters are popular and give one an amazing amount of warmth, yet taking up an extremely small amount of room under the coat. They are loosely knitted and many have collars and cuffs of soft, fuzzy Angora in white, which may be detached when desired. The closely knitted Shetland, Angora and brushed wool sweaters are all in demand.

For Rainy and Damp Days.

Every motor woman should possess one of the new Raynsters, the most practical garment that has come to my notice in some time. There are so many desirable models, attractive materials and smart colors that each and every woman may find just her particular fa-

vorite. The Folsomkote is illustrated herewith, and the Fullerkote and Falmouthkote are also very desirable. This material, as the name implies, is waterproof and every car should contain at least one of these garments. The Folsomkote is of single texture and is built with the new circular collar, which is convertible into funnel style, a graduated front belt, slanting slash pockets and is single breasted. The Raynsters are made in repps, cashmeres, tweeds, honeycomb mixtures, ribbon stripes and fancy checks. The cloth surface is outside with a fine, soft rubber proofing. The woman who possesses a Raynster will never again be without one.

There are short skirts of oilskin made up for the motor driver to be worn with coats much shorter than the usual motor coat. Motor knickers of cravenetted wool are to be worn with these skirts. Short oilskin and black rubber coats are shown to accompany the skirts and there are also attractive cravenetted materials that are weather and shower proof. The oilskin comes in lovely colors nowadays and costumes of this character do not make the motorist the freak they once did.

The Motor Skirt Useful.

Another garment of most excellent features for the motor driver is the new tri-way skirt of khaki of regulation army color. This skirt may be worn as any ordinary one or can be quickly converted into a divided skirt or gathered at the bottom, by a patented method, to form bloomers for work on the car, repairing a puncture on the road, etc. It is a wonderfully practical garment for the motor expert and is very smart in appearance. It may also be had in serge, gabardine and smart mixtures. There are two large pockets and buttons down the front.

The copper colored blouse, which is so

very modish at present, is most effective worn with the tri-way skirt. The copper hued blouses are of lustrous silk or satin, like the moon-glo satin and meteor. They are simply made, hemstitchings or rows of machine stitching, in self-colored sewing silk, being the only ornamentation, and with collars and cuffs of thinnest organdy or voile. In the moon-glo's—and there is nothing more modish—sulphur, presidio, Plattsburg and maize are strong in fashion's favor.

BLOOMER GIRLS MAKE APPEARANCE IN JERSEY.

Working girls in this country have been threatening for a long while to emulate their sisters overseas and don bloomers as a conventional working costume, but until recently have maintained the "try-it-on-the-dog" attitude, none being willing to set the pace.

However, the girls in the factory of the Semple Rubber Company, Trenton, N. J., have not only abandoned their fear and prejudice and donned the attire that has long been a distinguishing mark of the male sex, but are eager to show the more timid members of their sex that they are proud of the progressive step they have taken in throwing off the conventionalities which have long handicapped them in many pursuits.

The bloomers are a one-piece garment of medium weight blue material with a blouse. The legs reach the shoe tops, where they are gathered about the ankle with a puckering string.

WOMEN CHAUFFEURS ARE FEARLESS UNDER FIRE.

Many prominent women in Europe whose husbands are in the war have not been content to remain at home, but have gone to the front as ambulance drivers. At first the army officials were undecided as to whether to permit these women to operate the field ambulances, fearing that they would not be equal to the strain of driving and working under fire, but all doubts have been dispelled regarding the bravery of these women, as many have stayed at their wheels through fierce fighting and aided in picking up the wounded.

The wife of one Italian officer has been commended on several occasions for her bravery in piloting her car to the field of battle, mid rain of shot and shell. She has brought back many hundreds of wounded soldiers and her ambulance has been pierced with bullets in many places.

WOMAN DRIVES AMBULANCE.

Ethel Staples, an English woman, drives a war ambulance, and gives it complete care. Miss Staples, in a letter from London to the Cadillac Motor Company, says that she has driven an eight-cylinder Cadillac ambulance seven days a week for the past three months, and that everything has gone and is going lovely. In her letter she asks for a book of instruction, so that she may familiarize herself more thoroughly with the car's mechanical construction.

HOW TO REMOVE TRAVEL STAINS

Touring Motorists Learn to Use Cleansing Cream and Lotions in Preference to Soap and Water

Women who tour soon learn to abandon the soap and water method to cleanse the face in favor of a more ideal, equally sanitary and highly satisfactory way by the use of cleansing cream and other lotions. When traveling from city to city nothing is more injurious to the skin than the constant changing of the quality and properties of waters. Hard water particularly chaps the skin and coarsens the pores. Commence the day with a cream rub and then apply a vanishing cream, which should be entirely smoothed over the entire face and neck, which must be protected from wind and dust. Put on a fresh veil every day, for a dust laden veil works injury to the complexion of itself.

At the close of the day a good way to overcome the trip's disastrous effects on one's face is to use first some cleansing cream. The old idea was to massage

the cream into the pores of the skin, but latterly it has been learned that this tends to produce wrinkles, and that it is far more conducive to good results to pat the cream into the face. Do this rapidly with the tips of the fingers. This tapping stimulates circulation, which strengthens the tissues. After the cream has been on the face 10 or 15 minutes gently remove with a Japanese tissue. Next apply the astringent with a piece of cotton. When the astringent has fully dried into the skin, wrap a piece of ice in cotton and rub it carefully all over the face until it glows.

One must not neglect the eyes. Surely if one's face feels full of fine particles of dust, it must of a certainty mean the eyes have retained an undue portion of the dust of the road. Wash them carefully with a good eye lotion and then massage under the eyes with cold cream.

**DYER TOWING DEVICE.**

The Dyer Towing Device is a simple arrangement for fastening to the front axle of a Ford car, and making possible the towing of the car by another without the aid of a second driver. The device is designed for attachment to the axle and is fitted with a clamp, which is fastened to the steering spindle connecting rod. The other end of the device is fastened to the towing car. When a corner is turned the rear car is automatically steered by the device.

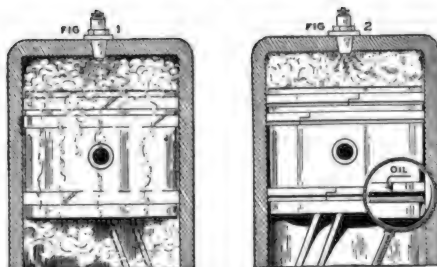
Manufactured by the G. H. Dyer Co., Cambridge, Mass. Price upon request.



Dyer Towing Device.



Speco Plug Energizer.



Before. After.
Application of No-Leak-O Piston Ring.



B-W Ford Ignition Coil Tester.

To give satisfaction the ignition system of a car must be in perfect working order. The Ford car ignition system and its proper performance is dependent upon four secondary coils. The adjustment of these coils is a delicate matter and "hit or miss" methods cannot be used if satisfactory functioning is desired. The B-W coil tester, illustrated herewith, is a device by which the coils may be tested and adjusted. It consists of a wood base upon which is mounted a low reading ammeter, receptacle contact springs in which the coil may be placed, two binding posts for connection with a six-volt storage battery, an adjustable spark gap and primary switch. The coil to be tested is slipped into place, a battery connected, the switch closed and the ammeter reading noted. If the coil is in good condition the ammeter reading should be approximately $1\frac{1}{2}$ amperes, with a continuous flow of sparks across a $\frac{1}{4}$ inch spark gap. The vibrator points are adjusted or spring bent until such a result is had.

Manufactured by Ballman-Whitten Mfg. Co., 2867 Gravois Ave., St. Louis, Mo. Price, \$5.10.

GEAR SHIFT EXTENSION.

The gear shift lever on practically all of the present day cars is not adjustable, therefore the person with short arms finds that considerable body movement is often necessary to change gears. To obviate this difficulty the Mellin's adjustable gear shift extension has been designed. This device is practically an extension lever, in three sections, that may be adjusted to suit practically any driver and by means of which the operator, with a single arm movement, can shift gears easily and without moving



Gear Shift Extension in Use.

the body. The device is ornamental and neatly finished in nickel plate.

Manufactured by M. & H. Novelty Co., 857 East 24th St., Los Angeles, Cal. Price \$1.25 or \$1.50, according to car.

NO-LEAK-O PISTON RING.

Every motorist realizes what would happen if the lubricating oil was taken from the engine—bearings would be damaged, cylinders scored and probably the engine entirely ruined. The same thing is true, to a certain extent, when the lubricating oil is diluted, or mixed with kerosene or gasoline. Such an action results when unburned gasoline or oil escapes past the pistons to the engine base. The No-Leak-O Piston Ring or Oil Sealing Ring, is a specially designed piston ring that has a deep groove cut around the face of the ring, with a scraping edge, in combination with a lap joint, which is said to form a perfect seal of oil; that is to say, with the groove full of oil all around the ring, the gas cannot escape, the refuse of poor gasoline cannot work into the crank case, nor can the oil from the crank case work into the combustion chamber.

Write for booklet M, Automobile Accessories Co., 816 W. North Ave., Baltimore, Md., or to Auto Appliance Co., room 500, 110 W. 34th St., New York.

SPECO PLUG ENERGIZER.

The Speco Plug Energizer is a device designed to be attached to the spark plugs of an engine. When the secondary current is passed through it the voltage is said to be increased and the amperage decreased, thereby prolonging the life of the spark plug electrodes. The manufacturers claim that when this device is used all plugs give the same intense, high frequency spark, no matter whether they are old or new, good or bad, dirty or clean, broken or whole.

Manufactured by Speco Mfg. Corp., 1777 Broadway, New York City. Price upon request.

KING KARBON KILLER.

Carbon accumulating on piston heads where it becomes white hot and causes preignition, or back firing, which badly strains the crankshaft and tends to loosen the bearings, vitally affects the running of an engine and reduces its efficiency. King Karbon Killer is a preparation of highly concentrated chemicals,

which is said to do away with all carbon troubles. One cube is placed in each five gallons of gasoline, causing, the makers state, an increased mileage efficiency of not less than 25 per cent. With every explosion a neutralized oxygen gas is generated, which gradually disintegrates the carbon deposits, the loosened particles of carbon passing out through the exhaust.

Manufactured by King Karbon Killer Corp., 15 Park Row, N. Y. Price, \$1 for 24 cubes.

EUREKA GRINDING COMPOUND.

One of the standard products that has been proved by time is known as the Eureka valve grinding compound. This compound is made to be safely used on any gasoline engine and the choice of three grades is given: Fine, medium or coarse. It is put up in one-pound can, which is of the compression type, absolutely air tight. This product is constantly growing more popular with discriminating manufacturers, engineers, garage dealers and repair men.

Distributed by J. H. Faw, Inc., 41 Warren St., N. Y. City. Write for prices.

IMPROVED BEMUS TIMER.

The 1917 Improved Bemus Timer is somewhat different from the older models, as a number of improvements have been embodied. This timer differs from the regular Ford timer in that there is no constant rolling contact of the brush with the timer body. In the Bemus timer four ball contacts are mounted in the case, and contact is made against the brush, which is mounted on an eccentric. The brush is so designed that contact of the four points is made at different points, thus minimizing wear.

Manufactured by Motor Specialties Co., Waltham, Mass. Price \$2.

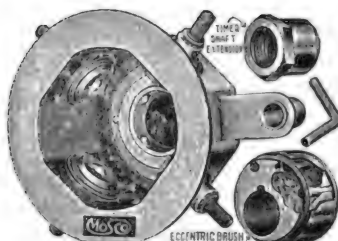
NIXITE SPARK PLUG.

A plug which is claimed to be entirely different from anything now on the market is called the Nixite Spark Plug. The electrodes, as will be noted in the illustration, are so designed as to permit a broad, thick spark, which is claimed to result in both quick and perfect combustion. The insulating material is a new product, called Nixite, and is mounted inside a special steel shell, which offers protection from breakage. The exterior or outside part of the plug is similar in appearance to an ordinary plug, but the material at the top is Bakelite. This material offers protection against breakage from outside blows. The manufacturers cover the plug with a "life" guarantee and state that any part of the plug will be replaced free of charge if returned to the factory in the box, together with 10 two-cent stamps, to cover cost of packing and transportation.

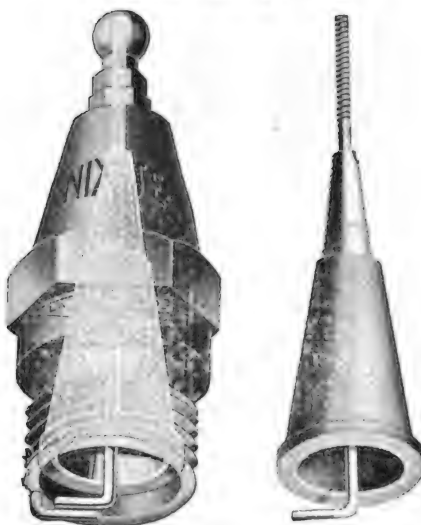
Manufactured by La French Power Spark Plug Co., 16-18 East First St., Columbus, O. Price \$1 each.



Eureka Grinding Compound.



Improved Bemus Timer.



Nixite Plug and Electrode.



Vaporator Equipment.



The Monarch Governor Applied.

MONARCH GOVERNOR.

Whether the depreciation of a delivery car is five or 50 per cent. depends largely upon how it is driven. The flexibility and ease of operation of the Ford car make the temptation to extra speed unusually great. For this reason every merchant using in the business one or more Ford cars is vitally concerned with their care. A business vehicle, truck or delivery car should not be speeded as fast as a pleasure vehicle. If it is the strain is too great and its life is lessened. To prevent the misuse of the Ford car and control the car speed the Monarch Governor has been designed. The Monarch Governor is a self-contained unit, having no connection with any moving part of the engine or the car. Its sole function is to control the engine so that the engine speed will be nearly constant, regardless of the work it may be doing. This speed as expressed in miles per hour is set at any maximum desired by the owner; then the governor automatically takes care of the fluctuations caused by increased or decreased load, or by bad roads. The entire control, both manual and automatic, is through the governor throttle. The driver may control the car to any speed below the maximum speed, but cannot drive above this maximum.

Manufactured by Monarch Governor Co., 524 Bethune Ave., West, Detroit, Mich. Price, \$25 complete with manifold.

THE VAPORATOR.

Every motorist is interested in the reduction of fuel cost, and, it would seem that the only practical solution of this problem at the present time is to use kerosene or coal oil for fuel, rather than the more expensive gasoline.

The Vaporator, the makers say, is a practical and efficient device for the utilization of coal oil as a fuel. Not only a reduction in fuel cost is claimed, but also an increase in mileage per gallon. This device combines an exhaust and intake manifold, to which is attached the standard Ford carburetor. Attached to the front of the seat and connected with the manifold is an auxiliary gasoline tank holding 1 1/3 gallons. The gasoline is used simply for starting, after the engine has heated up, this fuel is shut off and the engine continues to run on kerosene, which is held in the main tank. The full equipment comes ready to attach and requires no special fitting or boring of holes.

Manufactured by the Vaporator Mfg. Co., 2737 Washington Ave., St. Louis, Mo. Price, \$16.50.

SE-MENT-OL.

As a leaky radiator will cause untold bother to the touring motorist, it is policy for him to carry along a sealing compound in his tool kit. A compound which is made for this purpose is called Se-Ment-OL. This chemical is poured into the radiator and mixes with the water

contained therein. Immediately upon its exposure to the air through breaks in the radiating surface, it hardens, thereby sealing up the leaks.

Manufactured by the Northwestern Chemical Co., Marietta, O. Price, 75 cents.

COZY-CAMPMOBILE.

The leaving behind of essentials frequently spoils the enjoyment of the automobile camp trip. There is usually such a great number of necessities, bedding, food, tents, etc., required by modern itinerants that the automobile is literally lost to view if taken in the ordinary, haphazard way. This is not so, however, when a trailer is used, and the Cozy-Campmobile is designed in such a way as to contain all of the essentials. It is not only a tent, but sleeping and eating quarters, all in one. With the outfit are furnished two wire spring beds, mattresses, collapsible table, two-burner gasoline stove and ice box in a specially arranged draw.

The ice box, as well as the other compartments for table ware and food, are accessible without setting up the tent, so that a dinner may be prepared on the road. When in transit the trailer is compactly packed, making a neat appearance. It has the advantage that it may be used independent of the automobile for other purposes. The automobile may be disconnected in a moment and used for side trips, or the whole outfit may be used as a children's tent for the summer.

Manufactured by Cozy Trailer and Equipment Co., 42-44 Kentucky Ave., Indianapolis, Ind. Write for booklet and prices.

DASH AND TROUBLE LIGHT.

A handy little device for the motorist is known as the Comet combination dash and trouble light. The combination consists of two parts, a light bulb mounted upon a long, flexible cord, and an automatic spring winding reel, which is mounted in back of the dash. When in place the bulb is held up against the dash and forms a neat dash light. If it is desired to illumine any part of the car it is only necessary to take the light where it is wanted, the cord unwinding from the reel to such a length as is needed.

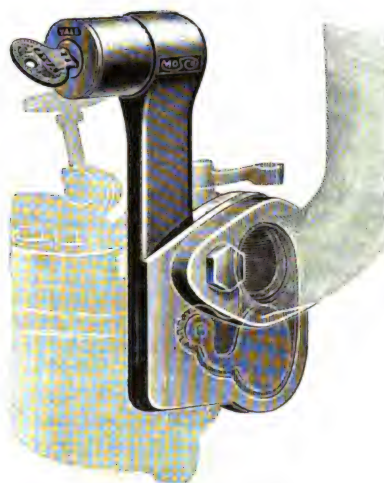
Manufactured by Auto Specialty Co., 39 N. Cherry St., Galesburg, Ill. Price upon application.



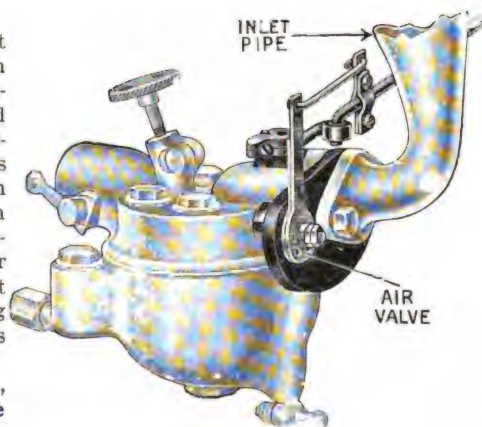
Cozy-Campmobile Set Up and on the Road.



Buffington Folding Chair.



Mosco Auto Lock.



Gasoline Economizer.

MOSCO VALVE GRINDER.

Every repair man realizes that to get good results valves must be ground into place properly. This means that the valve be turned back and forth and complete rotations carefully avoided. This operation requires both considerable skill and much patience. To accomplish this operation the Mosco Valve Grinder has been designed. The workings of this device is extremely simple. As the larger part of the grinder is held in place the handle at the side, which is attached to a chain coiled on a pulley inside the casing, is pulled slightly. This motion imparts a rotating motion to the valve tool and the makers claim a noticeable increase in valve grinding time. The device is fitted with two tools, one standard, the other for Ford valves.

Manufactured by Motor Specialties Co., Waltham, Mass. Price \$1.75.

GASOLINE ECONOMIZER.

It has been known for a long time that with the increase in speed of a gasoline engine, more air could be admitted and an increase of power obtained. For accomplishing this purpose the New York Automatic Gasoline Economizer has been designed. This device, attached between the intake manifold and the carburetor, has a lever which is fastened through suitable linkage to the throttle rod. As the throttle is opened a series of holes in the device are opened by the movement of the air valve and a certain amount of air is admitted which varies with the throttle position. The makers claim that when once adjusted the device requires no further attention.

Manufactured by New York Coil Co., 338-340 Pearl St., New York City. Price \$2.

TIRE CONSERVATION.

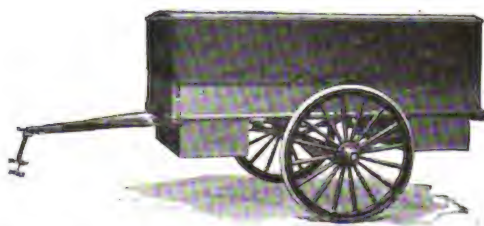
To aid motorists in cutting down tire costs, the Goodyear Tire and Rubber announces the publication of an entirely new and complete set of tire service bulletins, in which are set forth the various ways of obtaining more satisfactory tire service. Instead of adopting the "Don't" method, this series of books is written from the positive viewpoint, and the motorist is told just what to do to get the most service from his tires. The bulletins come in a series of 11 and may be obtained by any automobile owner free of charge.

Write to the Goodyear Tire and Rubber Co. of Akron, O.

BUFFINGTON FOLDING CHAIR.

The illustration shows a folding chair that weighs only nine pounds and can be folded into a space three inches thick. Such a seat is especially adaptable to small cars when an extra passenger is to be carried. The seat comes finished in Japan and may be had in a number of sizes.

Manufactured by C. A. Buffington & Co., Berkshire, N. Y. Prices upon request.



DEALERS FORM NATIONAL ASS'N

Big Distributors Organization with Potential Membership of 28,000 Launched at Chicago Meeting.

At a convention of dealers attended by about 150 car agents from all parts of the country, held in Chicago, July 11-12, the National Automobile Dealers' Association was formed as a permanent organization. It will include in its membership practically every dealer in the country who is a member of a local, county or state organization.

The membership dues in the organization are \$10 a year, but only dealers or managers of branch agencies are eligible who are members of some local dealer's association. There are 28,000 odd dealers in the country and it is expected that practically every one will become affiliated with the organization through the plan to have the National organization composed of all the local, county, state and sectional associations.

Until the next meeting, which will be held in September and probably for some time after, the energies of the association will be devoted to perfecting the organization, after which matters pertinent to the interests of the members, such as trade and legislative developments, will be taken up.

George W. Browne, the Overland distributor in Wisconsin, who went to Washington recently to fight the proposed five per cent. tax on all new automobiles, was elected president of the association. He is one of the best known men in the trade in the northwest and was one of the founders and first president of the Milwaukee Dealers' Association.

The first vice president is John H. MacAlman of Boston, Mass., who has been president of the Boston Automobile Dealers' Association for over 14 years. Mr. MacAlman, who handles the Stearns car in Boston, is one of the best known dealers in the East.

Other officers of the organization are: Second vice president, F. W. A. Vesper, St. Louis, Mo.; treasurer, Thomas J. Hay,

Chicago; secretary, Bart J. Ruddle, Milwaukee.

Directors—East and South, John H. Johnson, Boston; A. E. Maltby, Philadelphia; George D. McCutcheon, Atlanta. Central West, W. G. Tennant, Chicago; John A. Graham, Minneapolis; C. A. Forster, Cleveland. Far West, P. E. Chamberlin, Denver; P. H. Greer, Los Angeles; Dean Schooler, Des Moines. The directors will also appoint one vice president from each state.

SENT ORDERS FOR SIMPLEX STARTERS BY WIRELESS.

A dealer in Honolulu who handles the Simplex Ford Starters, made by the Simplex Mfg. Co., Anderson, Ind., finding that his stock was getting low and that an immediate supply would be necessary to accommodate his customers, sent an order by Marconi wireless to San Francisco, where it was relayed by telegraph to the factory.

The Simplex company recently placed another accessory on the market which is gaining popularity as rapidly as their starter. It is a low priced ventilating windshield bracket for Fords and can be mounted in a few minutes and enables the driver to tilt the lower section of the glass windshield and throw a current of cool air on the floor of the car in front of the driver's seat, carrying off the heat from the engine and making riding much more comfortable, particularly in warm weather.

"HYATT ROLLER" CAR COVERS 266,000 MILES.

The "Hyatt Roller," which has a record of 261,800 miles traveled when it was started from Detroit, June 4, on a 15,000-mile trip across the continent and return,

to further demonstrate the wearing qualities of Hyatt bearings with which it was equipped when it left the Buick factory in 1909 as a model 16, has already reached the 266,000-mile mark.

The car, which is owned by F. E. Slaton of Plainville, Kan., was the winner of the mileage contest conducted by the Hyatt Roller Bearing Company in 1915, when a prize was offered to motorists whose cars had traveled the greatest distance on a single set of Hyatt bearings. This test was held to obtain data on motor cars which had traveled the farthest on Hyatt bearings, but after the experts had examined the contestants and proved their claims, it was found that Mr. Slaton's Buick not only topped all the others for mileage, but held a world's record.

The record is particularly remarkable in view of the fact that no special care was taken in operating, its services being practically every work for which a motor car can be used. It was used as a racing, demonstrating and trouble car, and also for touring, hauling and trucking and in livery service. The old "Hyatt Roller" on one occasion was driven through a stream, pulled to the opposite bank a two-ton automobile which was stuck and towed it 40 miles. Loads of 1800 pounds have been carried on the car, also pianos, trunks and all kinds of baggage. It has worn out over 300 tires, representing a value of \$8000.

Albert A. Dryden, who has personally driven the car over 80,000 miles, is at the wheel on the present trip, which he feels confident will be made without any replacement of the Hyatt bearings. The trip is being made leisurely and the car is now out in the Rockies winding its way through the mountain passes.

SHADBURNE BROS. TAKE OVER BOUR-DAVIS CO.

Shadburne Bros. Co., Chicago, have acquired the Bour-Davis Motor Car Co. of Detroit and will continue the manufacture of the Bour-Davis car at their new plant at Frankfort, Ind.

The Frankfort plant, which was recently purchased by Shadburne Bros., who make the Shad-Wyck Six, is located at the intersection of three railroads and equipped with every device for efficient production. Shad-Wyck Six cars will also be manufactured in the plant.

General sales offices for both cars will be maintained at 2700 S. Michigan Ave., Chicago.

EMPIRE ANNOUNCES TOURABOUT.

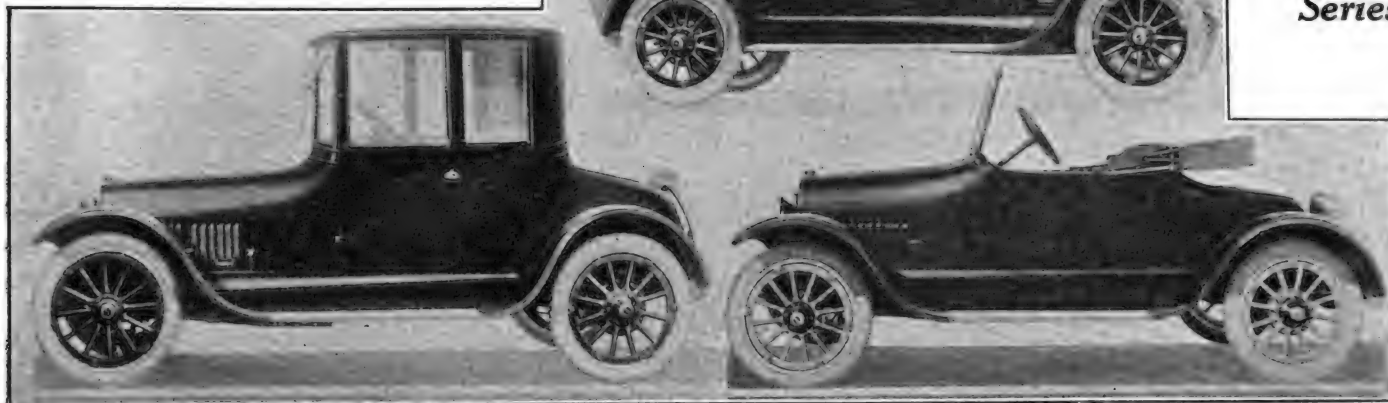
The Empire Automobile Co., Indianapolis, Ind., in addition to its new series of four and six-cylinder touring cars, has announced a new four-passenger, six-cylinder tourabout, in which is incorporated a number of new features. This model will be known as No. 71 and is equipped with a Continental engine. It sells for \$1285 f. o. b. Detroit.



World's Long Distance Car Equipped with Hyatt Bearings Making Another 15,000-Mile Trip Through the United States.

Changes Disclosed in Buick Models

**New
1918
Series**



At the Top, Buick Valve in Head Six-Cylinder, Five-Passenger Touring Car, Priced \$1265; Left, Touring Coupe for Three or Four Passengers, \$1695; Right, Four-Cylinder Roadster with Streamline Body and Sloping Windshield, \$795.

TWO standard engines and three standard models of chassis with a number of new body designs comprise the Buick line of cars exhibited for 1918. The engine, formerly known as the Little Six, has been discontinued, thus leaving but the two standard engines, a large six and a four.

The four-cylinder chassis, upon which are mounted the smaller types of bodies, is similar to that of last year, differing in a few minor details. The oiling system has undergone the greatest change, for the old type of plunger pump has been replaced by a gear type, driven from the camshaft by a horizontal shaft. In addition to this a sight feed indicator has been installed on the dash, together with an ammeter.

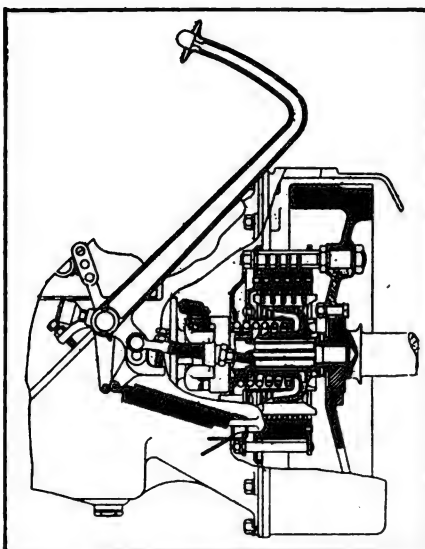
The valve lift arrangement has been altered slightly and provided with dust guards. In the universal joint steel pins without bushings are used.

To promote easier riding the rear springs have been lengthened about four inches. As an added convenience in driving the gear shift lever has been lengthened slightly and is more accessible.

The body is, perhaps, a little more up to date and more comfortable because of the higher backed seats and plaited cushions. Around the body have been added trim rails, which add to the appearance, as does the new, narrow type of instrument board.

Instead of the rubber mat, linoleum is used for the floor. The top is of mohair and the sides are fitted with larger windows than formerly. The windshield is of a different type, as are also the fenders, which are crowned.

As has been said the Little Six engine has been discarded, and in its place the larger six is used. This larger engine has not been changed materially, but the chassis wheelbase has been lengthened to 118 inches and a dry plate multiple disc clutch is used in place of the cone.



Disc Clutch Which Replaces Cone Clutch on Sixes.

For the heavier type of bodies the larger type of chassis, which is the same as the first with the exception of the wheelbase, which is 124 inches.

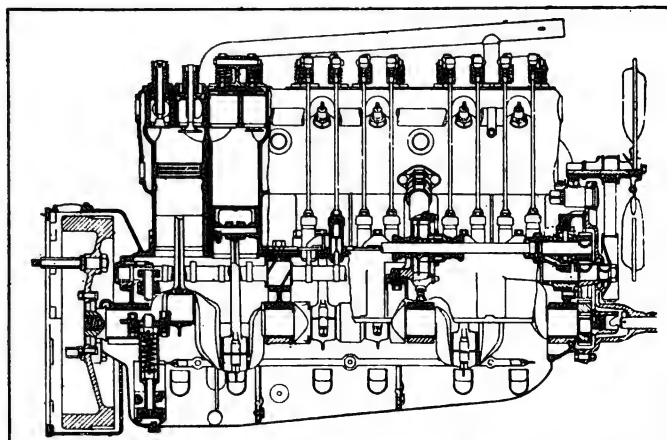
The body line for the new year has been made somewhat more complete, including practically all of the types of cars now in style. The four-cylinder chassis may be fitted with either of two styles of bodies and a delivery body. The first a two-passenger roadster, the second a five-passenger touring car, both selling for \$795. The delivery wagon is priced at \$5 less.

On the smaller six chassis four bodies may be had; a three-passenger roadster at \$1265, a five-passenger touring car at \$1265, a three-passenger coupe at \$1695 and a five-passenger Springfield type sedan for \$1795.

The larger six chassis is fitted with either a seven-passenger convertible sedan with permanent top and disappearing glass panels at \$2175 and a seven-passenger touring car for \$1495.

WOMAN'S REGIMENT ON RUSSIAN FIGHTING LINE.

Trained by a man sergeant a complete regiment of women soldiers is announced as fighting at the front for Russia against the Germans. The members of the regiment have their hair cut short, according to the dispatches, and are showing efficiency and valor. The appearance of a woman's regiment in benighted Russia is one of the surprises of this most surprising war of the world, and yet it is in well as the great nation under whose keeping with the progress of the sex, as colors they do battle for freedom and democracy.



Sectional View of Engine Which Is Now Made Standard on All Buick Six-Cylinder Cars.

PLATE FIVE.

MODEL SERVICE STATION AND SALES ROOM.

Two-Story Fireproof Structure Complete with Show Room, Machine and Repair Shops—Generous Spacings and Modern Equipment

Designed by the Architectural Department of the Automobile Journal Publishing Co.

THE accompanying plans offer a suggestion for an ideal automobile building to be used by an up-to-date, progressive dealer, and its arrangements permit of its use for practically every branch of the trade in which he can conveniently engage.

Facilities are provided for handling the agency for one or two new cars, and the appointments are such that the dealer may handle used cars and take live or dead storage. Space is also provided for the care, renovation and repair of cars. In fact, an examination of the plans will reveal that a careful survey has been taken of the progressive dealer's requirements, which has been taken into consideration in the design offered.

Having provided for all the practical needs of such a structure, the architect has taken into consideration the value of nice appointments where customers are received and accommodated in addition to providing a suitable facade, which is valuable as an advertising feature, a fact testified to by the thousands of dealers throughout the country who have gone to considerable expense in having highly decorative fronts erected to their buildings whenever their means would warrant it.

This structure, of course, is primarily for a dealer in a fairly large city where business would pay for its erection, maintenance and a profit. It is designed to go on a corner lot 50x100 feet. On the ground or first floor plan is an entrance vestibule, leading off the main street. To the right of the entrance is the show room, where several cars may be exhibited and an accessory case set up with other stock displayed in glass cases on the walls. On the left side of the entrance is the office, which has an entrance leading into the garage floor and shops.

On the side street there is a service door leading directly into the garage and in front of the turn table. This arrangement enables the operator of the car to turn his machine in any direction and run it to any position in the garage, onto the elevator or into the repair shop. The latter room is fitted with two repair pits, although there is sufficient room to handle three cars at a time or possibly four.

Maneuvering cars about inside of a building has always been found a troublesome problem, but the arrangement given in these plans, in relation to the layout of the building, seems to offer a simple and easy solution.

In one corner of the garage, out of the way

of the passages from the entrances to the other points in the room, is a wash stand conveniently located near both the turntable and elevator, thereby facilitating the washing and storage of a car with little trouble.

A machine shop of ample dimensions is walled off in the rear left hand corner of the building and lighted by a huge skylight in the light shaft extending through the second floor to the roof. There is an entrance to the machine shop from the garage; also one to a passage back of the elevator, which leads across to the repair shop for the convenience of the machines.

On the second floor are toilet accommodations for customers, office employees, salesmen, a large floor area devoted to new and used car storage, supply and locker rooms and toilet for the employees. Entrance to the front of the second floor is reached by the main staircase, which leads into a hall similar to that on the first floor. To the right of this hall is a rest room and toilet for ladies and on the right similar accommodations for gentlemen.

In the centre of the rear end of the second floor is the elevator well, which divides the skylight over the machine shop from the locker and supply rooms and employees toilet. These rooms may be reached from the repair shop by stairs.

The exterior of the building is of terra cotta with tile inlay, backed with brick. Steel is used for the frame, large girders in the floor and roof supported on steel "H" columns in piers that are spaced as shown by dotted lines on plans. Reinforced concrete floors and roof slab are necessary to make it a fireproof structure.

Lighting and heating equipment must be of standard make and complying with insurance underwriters requirements. Fireproof specifications would also include steel sash throughout and an automatic roller door at the service entrance on the side street.

The gas tank and service pumps are located outside the entrance on the side street and are connected up so that cars may be filled either from the inside or transient customers may be accommodated at the curb. Lubricating oil reservoirs or tanks may be placed where found most convenient.

The construction cost of such a building with all modern improvements, of course, would vary according to labor conditions and material supplies in different localities, but a minimum estimate of \$25,000 and a maximum of \$30,000 would cover the costs approximately.

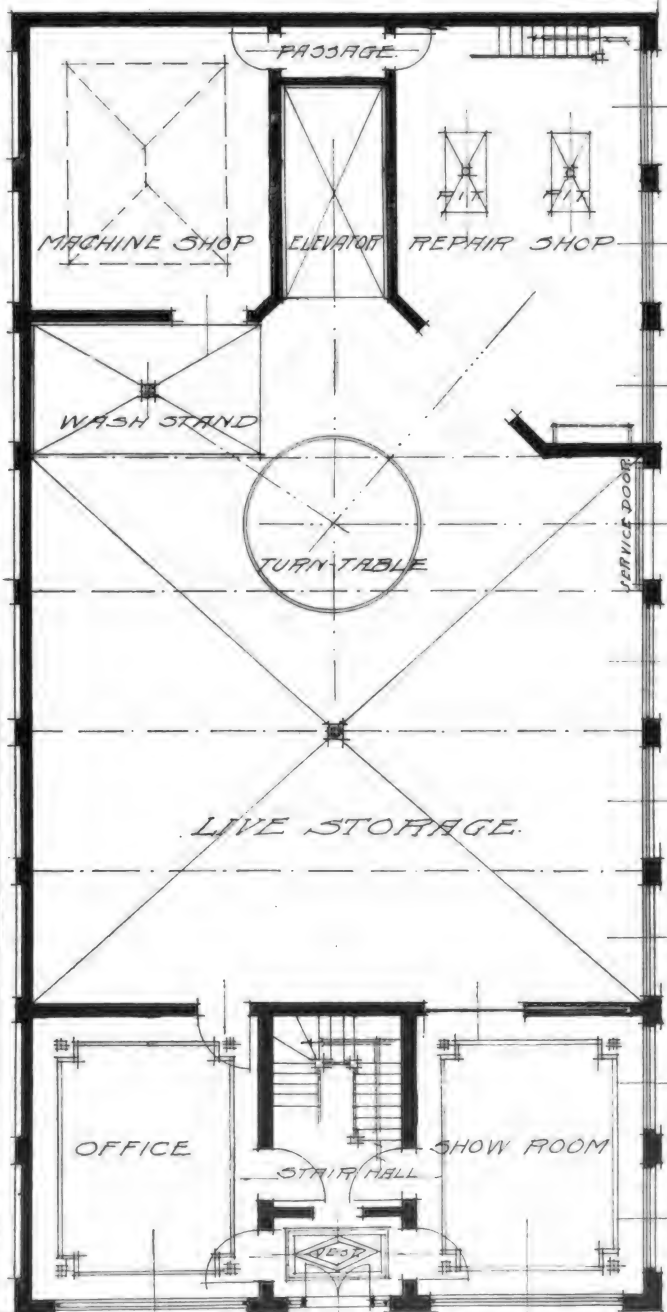
PLATE I.

SCALE

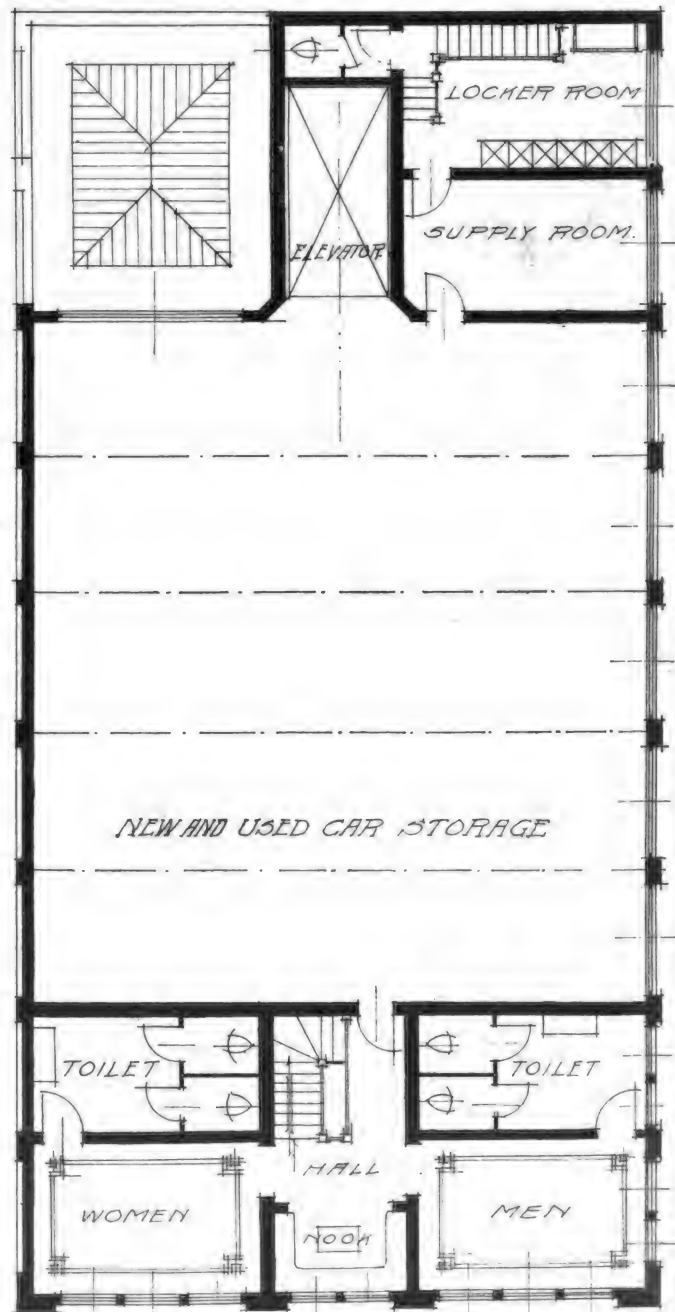
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ELEVATION.



FIRST FLOOR PLAN.



SECOND FLOOR PLAN.

The Business Side of the Motor Vehicle Industry

What Several of the Leading Car and Parts Makers, Production and Sales Organizations, and Allied Lines Are Doing or Have Under Consideration.

W. E. Stalnaker, vice president and director of sales of the Pathfinder Co., Indianapolis, Ind., recently received an appointment as major in the Fourth In-



W. E. Stalnaker of Pathfinder Co., Indianapolis, a Major of the Fourth Indiana Infantry.

diana Infantry. Mr. Stalnaker's son, William, is a captain in the same regiment.

The Kissel Motor Car Co., Hartford, Wis., has appointed the following new passenger car and truck dealers and sub agents during the past week: City Garage, Farmville, N. C.; J. F. Somers, Salisbury, N. C.; Guy E. Wells, Pine Bluff, N. C.; Laser Motor Co., 302 Centre St., Little Rock, Ark.; J. C. McCorkle, Richmond Center, Wis.; Barkshire-Walters Motor Co., Carruthersville, Mo.; C. H.

Burns, Walworth, Wis.; San Antonio Motor Car Co., San Antonio, Tex.; Beaumont-Cadillac Co., Beaumont, Tex.; Galveston-Cadillac Co., Galveston, Tex.; Houston Motor Car Co., Houston, Tex.

Frederick Wright, one of the best known men in storage battery circles, has become connected with the Permalife



Frederick Wright, Director in Charge of Production of the Permalife Storage Battery Co., Poughkeepsie, N. Y.

Storage Battery Co., Inc., Poughkeepsie, N. Y., and will have direct supervision of the manufacture of Permalife batteries in the modern plant recently acquired through the consolidation of Permalife and the W. L. Battery Co. of Poughkeepsie.

William G. Bee, better known in the automobile trade as "Billy" Bee, died at his home in Orange, N. J., after an illness extending over a period of two years. He was vice president and general sales manager of the Edison Storage Battery Co.

The Stutz Motor Car Co., Indianapolis, and the Parry Mfg. Co., which made a joint gift of six Stutz motor ambulances, recently delivered them to representa-



William G. Bee, Vice President Edison Storage Battery Co., Deceased.

tives of the government in that city.

The Emil Grossman Corp. sales force and department managers on July 20 and 21 at Brighton Beach, New York, held a convention at the Brighton Beach Hotel.

The Springfield Body Corp. will increase its capital stock to \$3,250,000. Of this issue \$750,000 is to be eight per cent. cumulative first preferred; \$1,000,000 will be eight per cent. second preferred and \$1,500,000 common.

The stockholders authorized the increase in capital at the meeting held on July 27, and at which it was announced that the company would engage extensively in the airplane body business.

A new board of directors has been chosen, including the following: E. W. Wagner, president of the E. W. Wagner Co., New York and Chicago bankers; H. F. Tenney, president of the Syracuse Trust Co., Syracuse, N. Y.; C. A. MacDonald, counsel of the Wagner company; Harry L. Bill, works manager of the Chalmers Motor Co.; E. W. McGookin, former sales manager of the Springfield Body Co.

It is reported that B. F. Everett, well known in the automobile industry as a body and car manufacturer, will become president. G. W. Woods, head of the Springfield Realty Co., is secretary and treasurer of the company.

The Allen Motor Co., Fostoria, O., held its third annual distributors' convention



Six Motor Ambulances Presented by the Stutz Motor Car Co., and the Parry Manufacturing Co., Turned Over to the Government at Indianapolis.



Lakeside Quarters Enjoyed by Dealers Attending the Third Annual Distributors' Convention of the Allen Motor Car Co., Fostoria, O.

from July 9 to 14. The convention, which was attended by about 100 of the Allen distributors, terminated with the dealers being the guests of the company on a cruise among the islands in Lake Erie, touching at Put-In-Bay, Middle Bass and Cedar Point. The party landed at Toledo, where a farewell banquet was given at the Toledo club.

The Joseph Dixon Crucible Co. has issued a new booklet describing the uses of Dixon graphites for automobile lubrication. The contents are cleverly introduced with a story of the Roman Emperor, who covered the world with leather, and the connection between the story and the Dixon graphites is very interestingly drawn. The booklet will be sent upon application to the Joseph Dixon Crucible Co., Jersey City, N. J.

The Prest-O-Lite Co., Inc., has appointed as battery service stations the following firms and individuals: W. E. Rugeley, Moultrie, Ga.; Simpson Garage and Machine Co., 205 W. Main St., Newark, O.; Raymond & Haase, Thomas and Blossom Sts., Shenandoah, Ia.; Curry Motor Car Co., Effingham, Ill.; Henry Rick Battery Service Station, 9th and Main Sts., Gibson City, Ill.; General Service Co., 411 E. Main St., Belleville, Ill.; Charles A. Templeton, Inc., Benedict and Meadow Sts., Waterbury, Conn.; F. L. Higdon Co., Avenue A and 22nd St., Birmingham, Ala.; I. Kwileckis, Bainbridge, Ga.; Malone Coal, Grain and Motor Co., 2nd Ave.,

Albany, Ala.; Cherokee Garage, Gaffney, S. C.

The Puritan Machine Co., Detroit, Mich., has gathered an energetic staff about its head, President A. O. Dunk. The officers include: General manager and treasurer, H. G. Gremel; secretary, O. R. Taylor; service sales manager, E.



A. O. Dunk, President of the Puritan Machine Co., Detroit, Mich.

W. Hawley; superintendent, Paul Gersick; advertising manager, M. R. Hilts. Mr. Hilts, although only 22 years old and the youngest member of the Puritan organization, entered advertising several years ago and has been connected with the Oakland and Paige-Detroit motor car companies in their advertising departments.

Col. Chas. Clifton, president of the Pierce-Arrow Motor Car Co., has resigned as chairman of the Automotive Transport Committee of the Council of National Defense. He suffered a sudden break down in health and is retiring to recuperate.

The Pathfinder Motor Co. of America has been incorporated at Dover, Del., with an authorized capitalization of \$52,000,000 to engage in the manufacture of motors, automobiles, motor trucks, engines, etc. The incorporators are: C. L. Rimlinger, H. L. Mullin, Wilmington, Del., and Clement M. Enger, Elkton, Md.

The Fisher Body Corp., the largest builder of motor car bodies in the world, is reported to have received a contract from the government for over \$2,000,000 worth of airplane bodies.

The Guaranty Securities Co., which was formed in 1915 to promote the sale of automobiles on the partial payment plan, has declared a dividend for the quarter ending June 30 on a basis of two per cent. per annum. The company's surplus during the quarter increased from \$86,415 to \$210,078.

The Motor Products Corp. has disposed of the Rands manufacturing plant at a price said to be in excess of that at which the property was carried on the books. The Rands plant was not being used by the corporation, having been leased to other parties since Jan. 1.

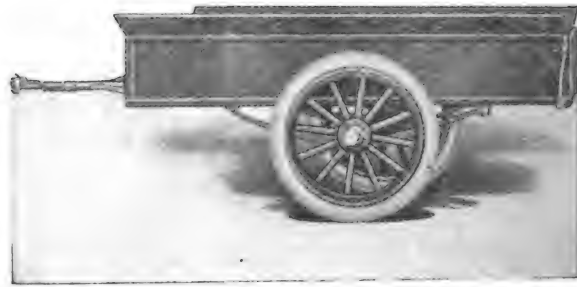
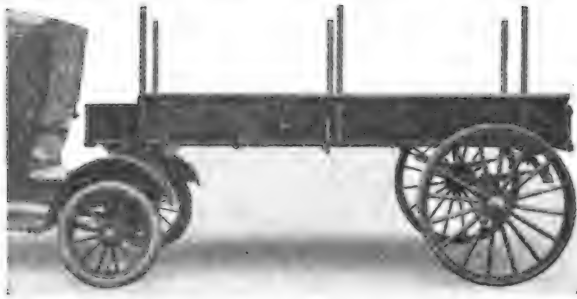
The Sparks-Withington Co. has received an order for 60,000 Sparton vacuum fuel systems from the Studebaker corporation.

The Buick Motor Co., Flint, Mich., will increase its production to 150,000 cars for the 1918 season.

The Bijur Motor Lighting Co., Hoboken, N. J., was granted patent No. 1,233,961 on July 21, which covers various features of the two-unit electrical systems so generally used on automobiles. The patent was applied for March 13, 1912.



Staff of Puritan Machine Co., Detroit, Mich.—Left to Right: H. G. Gremel, General Manager and Treasurer; Oscar R. Taylor, Secretary; E. W. Hawley, Service Sales Manager; P. J. Gersick, General Superintendent; M. R. Hilts, Advertising Manager.



Haul a 3000-lb. Load With Your Ford Car

A Ford runabout equipped with a Rocking Fifth Wheel, will have light truck capacity when used with STOCKBRIDGE 2000 or 3000 pound semi-trailers, and by uncoupling the body, which can be done in a very few minutes, the machine has all the utility of the pleasure car.

STOCKBRIDGE Semi-Trailers are the most practical equipment built. They are designed for truck service. They are operated with Ford economy. They can be coupled or uncoupled by any driver without help. The Rocking Fifth Wheel

is easily removed. No time is lost. Simply remove six bolts. The owner has a car or a unit with truck capacity and makes no sacrifice of the qualities of either type of vehicle.

The car and semi-trailer can make 20 miles an hour on good roads and can climb any travelled grade.

STOCKBRIDGE Semi-Trailers are constructed for truck service. The bodies are express type, with flareboards or flareboards and stakes. The brief specifications are:

	2000 Pounds	3000 Pounds
AXLE	1 5-8 in. square, Timken roller bearings.	Platform type, 2 in. wide
SPRINGS	Platform type, 1 3-4 in. wide	Platform type, 2 in. wide
WHEELS	46 in. outside diameter, artillery type hubs, 1 5-8 in. spokes	2 in. flat top, side wire
TIRES	Solid rubber, 1 3-4 in. flat top, side wire	2 in. flat top, side wire
EQUIPMENT	Complete Rocking Fifth Wheel ready for attaching	Complete Rocking Fifth Wheel ready for attaching
PRICES	\$195, f. o. b. Springfield, Mass.	\$225 f. o. b. Springfield, Mass.

SPRINGFIELD TRAILER, 800 pounds capacity, express body, semi-elliptic springs, 1 1-4 in. axle, ball bearings, 12-spoke automobile wheels, 30x3 in. pneumatic tires, price \$105, f. o. b. Springfield.

STOCKBRIDGE BODY COMPANY, 130-6 UNION STREET
SPRINGFIELD, MASSACHUSETTS

PILLSBURY
TRADE MARK
AUTOPUL

**PULL OUT OF
MUD, SAND OR
SNOW ON YOUR
OWN POWER.**

PLEASURE CAR OR TRUCK

All Highways are Passable—With a **PILLSBURY AUTOPUL**

An equipment, either permanent or quickly fitted to any car or truck, with which a ditched or bogged or tractionless vehicle can be drawn to a solid surface. The outfit can be carried constantly, requires but small space and is very light. Machines can be drawn forward or back as is necessary by their own power.

LIST PRICE, COMPLETE FITTINGS

Automobile Size, Japanned.....	\$8
Automobile Size, Nickel.....	\$13
Truck Size, Japanned.....	\$8 to \$35

All quotations f. o. b. Minneapolis, Minn.

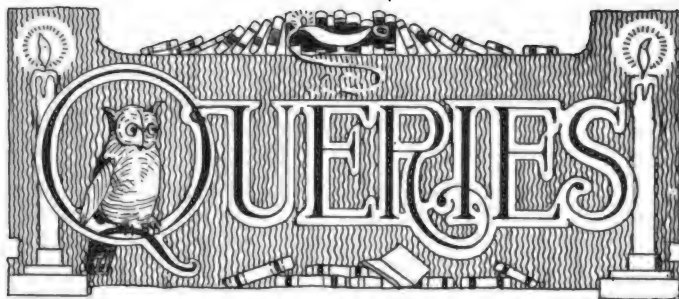
DEALERS AND JOBBERS: We have a big sales proposition for you. Write for it today.

PILLSBURY MANUFACTURING COMPANY, Minneapolis, Minn.

Indispensable for any truck, an ideal touring equipment, **PILLSBURY AUTOPUL** is a practical utility and an economy.

It consists of two winding drums, two special cable hooks and locking bolts and nuts. Stakes and cable furnished as extras, the cable or rope in lengths to meet any requirement.

PILLSBURY HUBPUL For Ford and model 490 Chevrolet cars —a combination Hub-Cap, Wheel Puller and Auto Capstan, consisting of two hub drums, two spoke hooks and wheel puller cap screw.	
Complete Set, Japanned.....	\$4
Complete Set, Nickel.....	\$6



NOTICE TO READERS.

THIS department contains the Mechanical Editor's answers to readers' inquiries. It is open to every subscriber. If any part of your car is not operating satisfactorily, or if you desire information regarding operating, maintaining or repairing motor cars, do not hesitate to lay your troubles before him. He will answer promptly and fully, either by mail or in these columns, as you direct. This service is free to every subscriber, and is often the means of saving considerable money that otherwise would be spent with a garage man. Letters should always be signed with the writer's full name and address, and the car or part in question should be properly identified, by mentioning the maker's name, model, year of production or other distinguishing feature. Address all inquiries to the Mechanical Editor.

THE AUTOMOBILE JOURNAL IDEA EXCHANGE.

For the benefit of readers of the Queries column it has been decided to conduct in this department a more widespread interchange of ideas. To this end the attention of readers is invited to the following question:

HOW DO YOU PRESERVE THE FINISH ON YOUR CAR AND HOW DO YOU REMOVE ROAD OIL FROM THE FENDERS AND BODY?

To the writer of the best answer to the above question \$2.50 will be paid. The best answer received will be published in the second issue after the appearance of the question in the magazine. Answers to the question should be in the hands of the editors by the 18th of August. The contest is open to every subscriber.

KEEPING TIRES IN CONDITION.

(Mr. H. McCollister, Woodbury, N. J.)

Best Answer to Third Question.

The most important thing in keeping tires in condition is to keep them properly inflated. Tires can be kept too hard as well as too soft, or underinflated. Some of the tire manufacturers publish a list showing the proper pressures to be carried in tires of varying sizes and weights of cars. My car weighs 2800 pounds and is equipped with 35 by four-inch tires. The front tires are kept at about 55 pounds and the rear 65 pounds, but in the case of old shoes which I place on the front for final service, but 45 pounds pressure is used.

To equalize the wear and justify the drive of the rear wheels I use the same make and design of tires on each rear wheel. These tires are removed every 1000 miles, carefully examined inside and out for fabric cuts, weak spots, foreign substances, etc., that may have worked into the shoe, and put back on opposite wheels; that is, the tire that was on the left wheel goes on the right wheel and vice versa. Should either of the shoes show excessive wear it is put on the front wheel when the front tire has worn out.

Before replacing a tube or putting a tire into place I always pass a large, soft brush around the inside of the shoe to remove dust and dirt. The shoe is then dusted with powdered soapstone, not liberally, but enough.

I make a practise of examining my tires every few days and, as I said above, a thorough examination every 1000 miles. Small cuts or small cracks receive immediate attention, as do punctures, by carefully washing them with gasoline and then giving them two or three coats of rubber cement, allowing each coat to dry thoroughly. After this has been done the cut is filled with tire gum, which is cemented in and smoothed to the surface of the tire.

(When Writing to Advertisers, Please Mention The Automobile Journal.)



ONE OF THE REASONS
**The Particular Auto Owner
Uses,
Values,
Requests,
Utility
Varnish
Renovator.**

It is guaranteed not to injure any varnish finish on which it is used.

The best sales proposition of the year for jobbers and dealers. A business increaser and a money maker. Write for it.

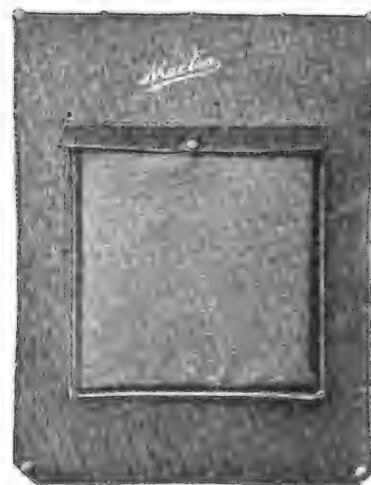
LIST PRICES:

4 Ounces, bottles	25c	Quarts, tin	\$1.00
12 Ounces, bottles	50c	Gallons, tin	\$3.00
		Sprayer	25c

POUGHKEEPSIE UTILITIES CORP.

46 Winnikee Ave. POUGHKEEPSIE, NEW YORK

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List Price, 75 Cents Each

An Ideal Equipment For Cars Without Door Pockets

that can be quickly installed and affords extreme convenience. Made of highest grade leather cloth, that will not crack or peel and has longer endurance than leather.

A fast selling profitable accessory. When ordering always state whether for Ford or Chevrolet.

Martin leather cloth specialties, the finest line made, includes Tire Covers, Radiator Robes, Tube Cases, Engine Robes, Robe Rail Bags, Water Buckets, Headlight Dimmers, Etc. Not equalled for quality, and sold for moderate prices.

Write for Jobbers' and Dealers' Catalogue and Quotations

Martin Manufacturing Co.

LANCASTER

OHIO



Have you received a copy ?

Our catalog contains more than 500 staple repair items, such as Magneto Repair Parts, Platinum Contact Screws, Breaker Arms, Brushes, Distributor Parts and Coil Parts, also Platinum Contacts for Magneto Repair Work and Tungsten Contacts for Distributors and Coils. These items are purchased by every car owner and you should be able to supply them.

There are also listings and illustrations on Starter and Generator Brushes, giving you the name of the car, year, model and brushes to be supplied. This is very valuable data which you should have on record.

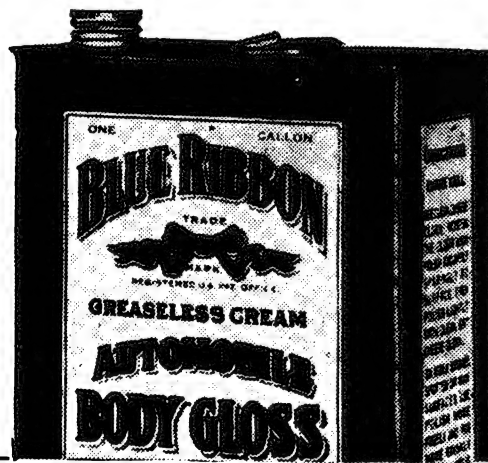
This catalog also gives you information as to what systems are used on various makes of cars so as to enable you to intelligently serve your customers' needs. It will help you to build up a more permanent business.

We furnish a special "CASH REGISTER OF CONTACT PARTS" free with an assortment of parts.

This is a most complete and comprehensive catalog published on Repair Parts and Contacts. Our jobbers can serve you.

In buying request "NIEHOFF REPAIR PARTS," THEY ARE GUARANTEED.

PAUL G. NIEHOFF & CO., Inc., Clark St. at Kinzie, Chicago, Ill.



Keeps the Body of Your Car Shining Like a Mirror

No Grease to Catch Dust—Does Not Coat the Finish—Best Furniture Polish Made—Use With SPRAY if Desired.

International Metal Polish Co.

INDIANAPOLIS, IND.

When an old tire begins to go, usually in one or two places, resulting, probably from a previous bad puncture, admitting moisture, I cement a section of an interliner (sometimes two sections if the tire is very weak) from 12 to 20 inches in length, inside the shoe. This repair will frequently give me several hundred additional miles before the tire ruptures.

Where a tire seems to be good on the inside, but shows a bad break in the tread, I clean the break with gasoline, give it four or five coats of cement to keep out the water and over it cement a section of old inner tube. This outside repair frequently lasts surprisingly long distances, and when the tube section is worn it is replaced with another piece.

I use great care in removing oil or grease from the tires, paying special attention to the sides of the shoe. Where simply dirt or mud is present I brush them off with a broom, sometimes scrubbing the side walls with water and soap.

Every time the shoes are removed the rims are cleaned and given a coat of a compound of kerosene and graphite, which facilitates the removal and replacement of tires.

My tire experience dates from 1910, and my average has been above 8500 miles, sometimes going over 10,000. This mileage I attribute to the fact that I adhere to the old maxim of "prevention is better than cure."

MITCHELL CLUTCH ADJUSTMENT.

(R. M., Pittsfield, Mass.)

The clutch on my Mitchell 1916 car does not seem to be working properly. When the clutch pedal is out the engine does not seem to "take hold" and consequently runs ahead of the car when ascending grades. How is the clutch adjusted?

There are four reasons for a slipping clutch: Worn out clutch facing; not enough tension on coil springs; hard or dry clutch facing, and clutch not allowed to engage fully.

If the clutch facing is worn or burned the leather facing should be replaced with a new one. This can be done as follows: Remove the shell which covers the joint at the forward end of the transmission gearset, also the shell covering the clutch hub. The short shaft between the clutch and gearset and the clutch hub can be removed. After the removal of the three clutch springs the clutch can be taken from the car.

A slipping clutch is sometimes due to lack of tension on the coil springs. There are three of these on the Mitchell car and to adjust them it is only necessary to remove the cotter pins and turn each nut about one turn, replacing the cotter pins so that the nut will not jar loose. In making this adjustment each nut should be turned an equal distance or the wear will be uneven.

If the clutch leather is hard or dry the smooth surface will slip easily in the flywheel. Let the leather stand for a time in kerosene oil, then make it soft and pliable with a liberal application of neatsfoot or castor oil. (Never use lubricating oil or gasoline.)

Due to worn facing the clutch pedal may hit against the floor or toeboard. This pedal should be entirely free when the clutch is engaged and if it hits the toeboard it should be adjusted. This adjustment is made by adjusting the two rods connecting the clutch pull shaft with the clutch yoke. Care should be taken to see that both rods are adjusted the same.

BOSCH DUAL SYSTEM EXPLAINED.

(W. W., New Haven, Conn.)

Will you please give me wiring diagram of the Bosch dual system? Can the coil of this system be used in connection with the Atwater-Kent system? Can the Splittorf dual coil be used in the same way? Where are the condensers located, in the coils or on the machines?

Herewith is given a wiring diagram of the Bosch dual system. A, is the magneto; B, the coil; C, the battery, and D, ground connections. The coil is of the vibrating type, and since the battery and magneto systems are practically independent of each other, there is a condenser located in both the coil and magneto.

The Atwater Kent ignition system consists of two units; a unisparker and a coil. The unisparker is a combination



No Day Too Cold for POLARINE

The Standard Oil for All Motors

Polarine feeds freely down to zero, giving to your motor the easy rhythm of mid-summer.

You will get more distance to the gallon with less wear on your motor by using Polarine Oil and SOCONY Gasoline. Look for the Red, White and Blue SOCONY Sign.

STANDARD OIL CO of NEW YORK

(Principal Offices)

NEW YORK
BUFFALO

ALBANY
BOSTON

POLARINE

(When Writing to Advertisers, Please Mention The Automobile Journal.)

CONNECTING AMMETER.

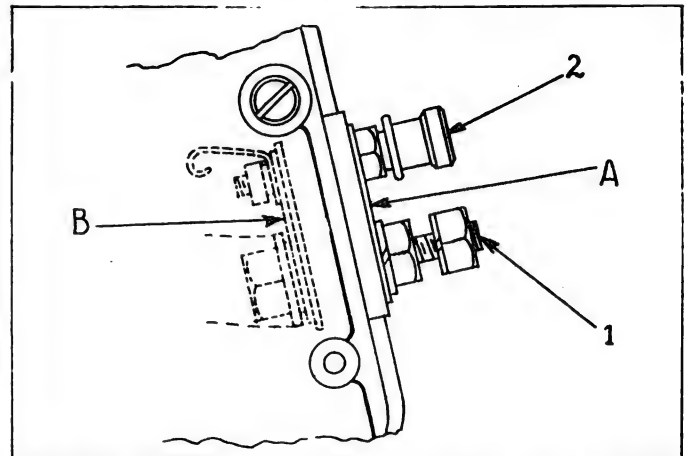
(F. A., Buffalo, N. Y.)

I have a Hudson 1914, model 6-40 car, and should like to connect an ammeter in the circuit for giving the charge and discharge of the battery and generator. My repair man tells me that such a connection cannot be made, as he has made a number of trials and experiments and can find no wire which carries all of the current. Can this instrument be installed without rewiring the whole car or changing the system? The generator is a Delco.

On this type of Delco generating system there is no exterior wire that carries all of the lighting and ignition current that does not carry the starting current also. It is, therefore, impossible to connect an ammeter in the circuit as it is at present. On the front side of the generator you will note two binding posts, the lower of the two (see sketch) which we will term number one, is connected through a heavy wire with the positive terminal of the battery; the other, or number two, is connected through the common ignition and lighting wire with the two switches.

Both of these posts are connected with each other by a brass bar, sometimes as shown at A, and this bar may be cut with a hack saw without removing the generator from the car. After this is done terminal number one is connected with the negative terminal of the ammeter, and terminal number two with the positive side of the ammeter.

On some of the Delco generators the connecting strap A



Illustrating Installation of Ammeter on Hudson Model 6-40 Car.

is not located on the outside of the generator as shown, but on the inside as shown by the dotted lines at B. In this case it is necessary to remove the generator from the car and disassemble it. The ammeter is connected in the same manner after the bar has been cut, as if the bar were on the outside.

CANNOT THROTTLE DOWN.

(A. E. H., Pittsburg, Pa.)

I should like to know what the trouble may be with my Ford car. Since I took the carburetor off, to clean it, about three weeks ago, the engine cannot be throttled down as much as I think it ought, though at ordinary speeds it runs without skipping.

There are a great number of possibilities for your trouble. It is probably due to carburetor or carburetor manifold, since it is to be assumed that the trouble has only existed since you took the carburetor from the engine.

In cleaning the carburetor it is possible that you might have bent the float arm, thus lowering the gasoline level to such an extent that quite a vacuum would be necessary before proper gasoline supply were obtained in the mixing chamber. You can determine this by making a mark on a piece of wire or straw, about one-quarter of an inch from the end, and, after removing the needle valve with the cover, inserting the straw through the needle valve inlet until the mark is flush with the top of the seat, or bottom of the mixing chamber. Upon withdrawal of the straw note the height that has been mois-

tened by the gasoline. The distance between the top of the gasoline and the bottom of the mixing chamber should not be more than one-eighth of an inch. While the needle valve is out of the carburetor inspect the point and should it be blunt, bent or scored, replace it with a new one.

For low speeds it is essential that the joints between the carburetor and engine be absolutely tight, for this reason it is customary to put in new gaskets whenever the manifold is replaced, giving them a good coating of graphite and oil.

The closest attention should be given the joint between the carburetor and intake manifold. If the packing is rotted or pitted it should be replaced. This gasket may be liberally coated with shellac, taking care to clean all surfaces before the joint is made up.

Your whole trouble may be due to the fact that you have neglected to thoroughly tighten the manifold clamp nuts. These clamps should be tightened finally after the engine has been warmed up.

If you do not find that either the carburetor or joints are causing the difficulty, inspect the valve stem bushings, especially those of the intake. Should you find that the valves fit loosely in the guides it is to be assumed that some, if not all, of your trouble can be placed here. There is but one remedy, namely, to rebush the guides or put in new valves, perhaps both, though usually the bushings show the most wear.

Inspect the valve and tappet clearance, the distance between the valve stem and top of the tappet should be approximately the thickness of a visiting card, or less than 1/64 of an inch. If it is more than this you may find trouble in throttling the engine. Too close a setting, however, is to be avoided. After the engine has warmed up thoroughly, inspect each valve again. The clearance will not be as much in this case, but with the tappet at its lowest position it may be turned freely without binding on the valve stem. In other words, when the valves are closed the valve stems should not rest on the tappets.

Improperly fitting pistons and rings, as evidenced by lost compression, or poorly fitting valves, are both possible causes of your trouble.

If you find that the compression is poor you might try feeding about a teaspoonful of Dixon's graphite into the carburetor air intake while the engine is running. This will have a tendency to fill up small scratches or scores that might be in the cylinders.

The remedy for poorly fitting valves is regrinding.

Whether the valves need regrinding or not can be determined by their condition. In another article in this issue, dealing with the Ford car, we have taken up the grinding of the valves, as well as the possibilities of poorly fitting pistons, rings or scored cylinders.

As a final remedy go over the gasoline pipe line, cleaning it out thoroughly either with a wire or by forcing air through it.

HIS ENGINE OVERHEATS.

(F. W., Detroit, Mich.)

I have a Ford 1914 car which I have owned since it was new. Quite recently it has shown a tendency to overheat under normal conditions. The trouble has developed since I overhauled the engine about a month ago. At that time I ground in the valves, tightened two of the connecting rod bearings and tightened the clutch bands. The engine does not crank hard, neither does the car "creep" ahead or back while the engine is being cranked, so that I know it is not excessive friction that causes the overheating. Can you give me any other reasons?

There are a number of causes for overheating and, in brief, they are as follows:

- Over retarded spark.
- Incorrect timing of valves.
- Closed or clogged exhaust line.
- Clogged cooling system.
- Excessive friction.

The same cause for incorrect timing of valves would result in overretarded or improperly timed spark. It is essential that the valves of the Ford car be timed as follows: Ex-

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34x3 1/2	10.00	3.30	35x4 1/2	14.50	5.55
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haust valve opens 5/16 above bottom centre and closes on top centre. The intake valve opens 1/16 after top centre and closes 9/16 after bottom centre. When the valves operate in this manner the spark will necessarily then be correctly timed and should be advanced by the hand lever as far as possible without causing the engine to knock.

An obstructed muffler or a clogged exhaust pipe will frequently cause overheating. This will also be accompanied in most cases with a noticeable loss of power. The muffler should be disassembled at least once every year so that it may function properly. With the present grade of fuels there is a general tendency to cause excessive carbonization both in the cylinders and in the exhaust line. For this reason it is therefore economical to keep the exhaust line as clean as possible.

A clogged cooling system, the result of precipitation of anti-freezing solution, frequently may be found in the early season. Excessive accumulations resulting from the use of hard water cause overheating. A good solvent for many of the common accumulations is made by dissolving a half pound of lye in five gallons of water. Strain the liquid through a cloth and after draining off the water from the cooling system put this solution into the system, run the engine for about five minutes and draw it off, leaving the lower drain cock open. Flush the system well with clean water, fill it with water and after engine has been run for 10 minutes again draw it off and refill.

Since the engine cranks easily and the clutch bands do not drag, it is evident that there is not excessive friction either in the gearset or engine. Be sure that the emergency brake bands are not dragging on the drums.

SCHEBLER MODEL R CARBURETOR. (S. A., Chicago, Ill.)

Will you please send me the adjustment of the Schebler model R carburetor?

The Schebler model R carburetor is adjusted as follows:

Turn the auxiliary air valve, which is the large adjusting nut on the air intake, to the right as far down as possible; then back 1½ turns. Now turn the high speed adjustment, which is located directly beneath the auxiliary air valve adjusting nut, to the right, or as far up as it can be turned. With the carburetor adjustments set in this way retard both the spark and throttle and start the engine.

Now turn the auxiliary air adjustment either to the right or the left (usually to the left) until the engine fires in all cylinders. This gives the correct low throttle adjustment.

With the spark retarded turn the high speed adjustment to the left, or down, by half turns. After each half turn quickly accelerate the engine and note whether it backfires.

Continue turning down the high speed adjustment by half turns until the engine backfires on quick acceleration, then turn to the right, or up, until the backfiring stops.

Now try the same experiments with the spark advanced about half way on sector and note whether the engine backfires on acceleration. Make the adjustments as above directed upon the high speed adjustment until the engine does not backfire.

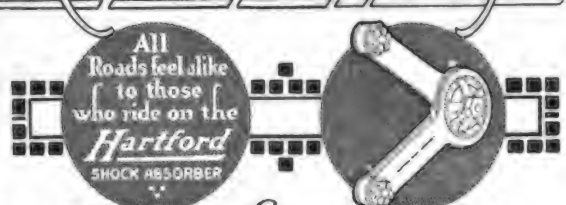
STEWART SPEEDOMETER SHAFT. (J. A. L., New York, N. Y.)

I have a Stewart model 102-F speedometer which is installed on my Ford car. About a week ago the speedometer ceased to register and when I removed the shaft I found that one of the links was broken. I can hook the new link into place all right, but cannot see how to put the shaft into the tube as there is a shoulder on both the fittings on each end of the shaft. Can you tell me?

You will find that the fittings on the ends of the flexible shaft are different, one is nearly twice as long as the other one. Remove the short fitting by unhooking it from the first link and slip the chain with the long fitting attached into the flexible tube. This is done easily if the shaft is held so that it hangs free. After the shaft has slipped into place and the long fitting has brought up against the shoulder at one

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inducing magnetism into the steel magnet. You will see that it is better to recharge the magnets so that the poles will be as originally charged.

To do this place a compass upon the transmission case about four inches back and $1\frac{1}{4}$ inches to the left of the magneto terminal. (The car should be set to face east and west.) Then make a mark upon the flywheel case $1\frac{1}{4}$ inches to the left of the magneto plug. Have the starting crank turned until the North pole of the compass needle points toward the mark.

Now remove the wire from the magneto plug and connect the plug with the positive terminal of an 18-volt storage battery. The negative battery terminal should be connected with a wire and the wire should be firmly pressed for an instant against the transmission base. Make the contact about four times and the magnets should be fully charged.

To properly charge the magnets requires about 25 amperes and from 18 to 24 volts. If dry cells are used at least 48 cells are necessary, connected in series-multiple, giving 24 volts. The approximate resistance required when 110 volt direct current is used is three ohms, or from 25 to 30-32 candlepower carbon lamps.

RESTORATION OF THE FORD. (Continued from Page 20.)

Should the bushings not fit they may be reamed with a straight reamer to the correct size. Such a tool is made by the G. H. Dyer Company of Cambridge, Mass.

Brake and Clutch Adjustment.

After the power plant the rear axle and the wheels are assembled, the brakes and clutches may be adjusted. The high speed clutch is adjusted by countersunk set screws, one in each clutch finger, and are kept from turning by a pin passing across the slot in the screw head. The high speed clutch should be adjusted so that it does not drag when the pedal is at its central position or when the emergency lever is pulled back, thereby holding the pedal at the centre.

The low speed, reverse and service brake bands are adjusted by turning the adjustment nuts on the cross members of each pedal, outside and inside the housing. It is essential that none of these bands drag when the pedals are in the "off" position.

The electrical installation should be completely removed from the car if it has been in use for any considerable length of time, the coils tested and the wires replaced by new. The timer should be carefully examined and a new roller or body put into place if there is evidence of wear. This will eliminate 50 per cent. of trouble if done immediately, since a greater part of the owner's troubles with used cars arise from grease soaked or oily and short circuited wiring.

Timing the Engine.

The firing order of the cylinders is 1, 2, 4, 3; number one cylinder being the nearest the radiator. The timer wires should be attached to the timer in this order and since the timer brush revolves counter clockwise the order of the connections when read clockwise is 1, 3, 4, 2.

To check up the timing it is necessary to turn the crank until the piston in number one cylinder is at the top of the explosion stroke. (This is the stroke when all of the valves in this cylinder will be closed.) Then turn it still farther until the piston has traveled about three-quarters of an inch downward. The timer rod is set at full retard and the position of the timer brush noted.

The timer roll will be over one of the contacts, and it is to this contact that number one wire should be connected; the other wires are then to be connected as before directed.

If the repairer has been careful in his work and has carefully noted the position of all parts before removing them, he will be able to replace them. He should always bear in mind that the work is to be done thoroughly, and should slight nothing. After the car has once been overhauled he can feel sure of every part and can place dependence upon his machine. In addition to this he can safely say that he knows his automobile, and is able to deal with such conditions as might arise when he is on the road.

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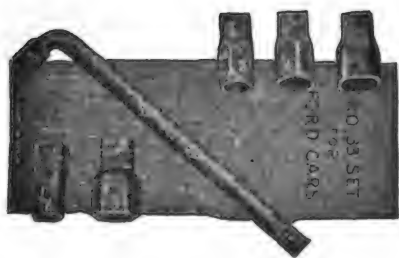
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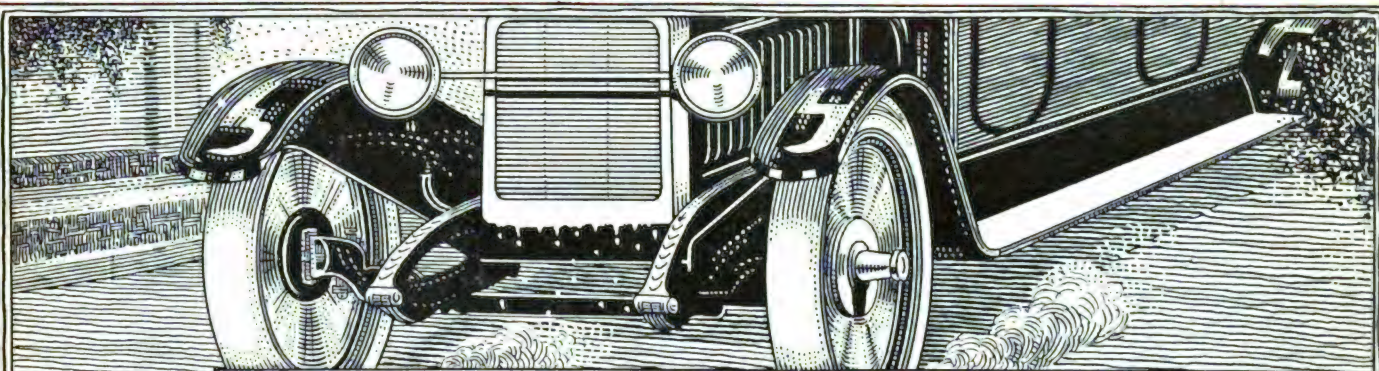
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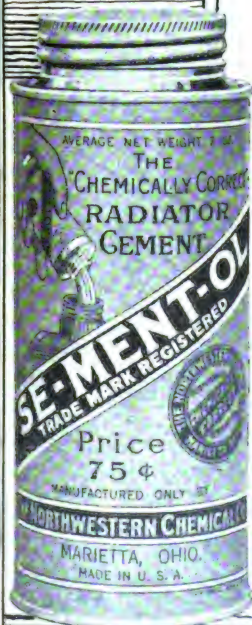
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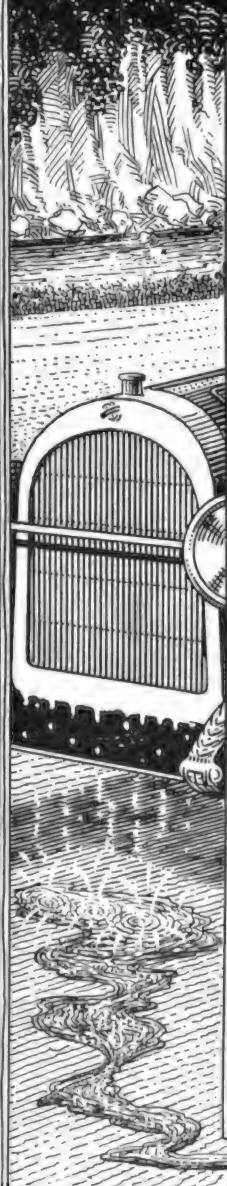
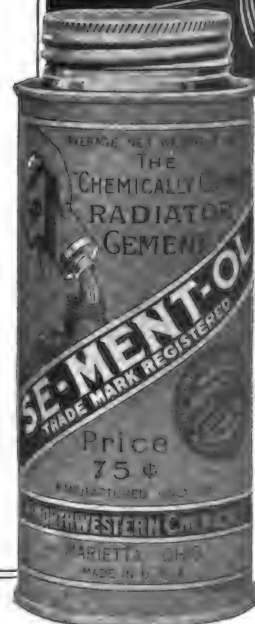
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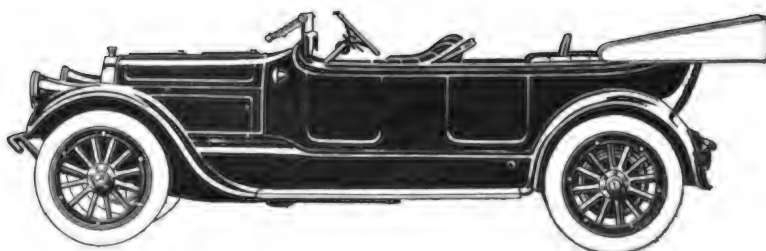
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